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Nortel VPN Router Troubleshooting

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Contents

Figures

Tables

Preface

This guide provides information about how to manage and troubleshoot the Nortel VPN Router.

Before you begin

This guide is for network managers who monitor and maintain the Nortel VPN Router. This guide assumes that you have experience with system administration and familiarity with network management.

Text conventions

This guide uses the following text conventions:

angle brackets (< >)	Indicate that you choose the text to enter based on the description inside the brackets. Do not type the brackets when entering the command. Example: If the command syntax is **ping** <*ip_address*>, you enter **ping 192.32.10.12**
bold Courier text	Indicates command names and options and text that you need to enter. Example: Use the **show health** command. Example: Enter **terminal paging** {**off** | **on**}.

braces ({})	Indicate required elements in syntax descriptions where there is more than one option. You must choose only one of the options. Do not type the braces when entering the command. Example: If the command syntax is **ldap-server source {external | internal}**, you must enter either **ldap-server source external** or **ldap-server source internal**, but not both.
brackets ([ ])	Indicate optional elements in syntax descriptions. Do not type the brackets when entering the command. Example: If the command syntax is **show ntp [associations]**, you can enter either **show ntp** or **show ntp associations**. Example: If the command syntax is **default rsvp** [**token-bucket** {**depth** | **rate**}], you can enter **default rsvp**, **default rsvp token-bucket depth**, or **default rsvp token-bucket rate**.
ellipsis points (. . .)	Indicate that you repeat the last element of the command as needed. Example: If the command syntax is **more disk***n*:*<directory>*/. . .*<file_name>*, you enter **more** and the fully qualified name of the file.
italic text	Indicates new terms, book titles, and variables in command syntax descriptions. Where a variable is two or more words, the words are connected by an underscore. Example: If the command syntax is **ping** *<ip_address>*, *ip_address* is one variable and you substitute one value for it.
`plain Courier text`	Indicates system output, for example, prompts and system messages. Example: `File not found.`
separator (>)	Shows menu paths. Example: Choose Status > Health Check.

vertical line (|)	Separates choices for command keywords and arguments. Enter only one of the choices. Do not type the vertical line when entering the command. Example: If the command syntax is **`terminal paging`** {**`off`** | **`on`**}, you enter either **`terminal paging off`** or **`terminal paging on`**, but not both.

Acronyms

This guide uses the following acronyms:

ADSL	asynchronous digital subscriber line
ARP	Address Resolution Protocol
ATM	asynchronous transfer mode
CA	certificate authority
CHAP	Challenge Handshake Authentication Protocol
CMP	Internet Control Message Protocol
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
FTP	File Transfer Protocol
HTTP	Hypertext Transfer Protocol
ICMP	Certificate Management Protocol
IKE	IPsec Key Exchange
IP	Internet Protocol
IPsec	IP Security
IPX	Internetwork Packet Exchange
ISDN BRI	integrated services digital network basic-rate interface
ISP	Internet service provider
L2F	Layer 2 Forwarding

L2TP	Layer 2 Tunneling Protocol
LAN	local area network
LDAP	Lightweight Directory Access Protocol
NAT	Network Address Translation
OSI	Open Systems Interconnection
OSPF	Open Shortest Path First
PAP	Password Authentication Protocol
PCAP	packet capture
PDN	public data network
POP	point of presence
PPP	Point-to-Point Protocol
PPTP	Point-to-Point Tunneling Protocol
RADIUS	Remote Authentication Dial-In User Service
RIP	Routing Information Protocol
SNMP	Simple Network Management Protocol
UDP	User Datagram Protocol
URL	uniform resource locator
VPN	virtual private network
VRRP	Virtual Router Redundancy Protocol
WAN	wide area network
XNS	Xerox Networking System

Related publications

For more information about the Nortel VPN Router, see the following publications:

- Release notes provide the latest information, including brief descriptions of the new features, problems fixed in this release, and known problems and workarounds.
- *Nortel VPN Router Configuration — Basic Features* (NN46110-500) introduces the product and provides information about initial setup and configuration.
- *Nortel VPN Router Configuration — SSL VPN Services* (NN46110-501) provides instructions for configuring services on the SSL VPN Module 1000, including authentication, networks, user groups, and portal links.
- *Nortel VPN Router Security — Servers, Authentication, and Certificates* (NN46110-600) provides instructions for configuring authentication services and digital certificates.
- *Nortel VPN Router Security — Firewalls, Filters, NAT, and QoS* (NN46110-601) provides instructions for configuring the Stateful Firewall and VPN Router interface and tunnel filters.
- *Nortel VPN Router Configuration — Advanced Features* (NN46110-502) provides instructions for configuring advanced LAN and WAN settings, PPP, frame relay, PPPoE, ADSL and ATM, T1CSU/DSU, dial services and BIS, DLSw, IPX, and SSL VPN.
- *Nortel VPN Router Configuration — Tunneling Protocols* (NN46110-503) configuration information for the tunneling protocols IPsec, L2TP, PPTP, and L2F.
- *Nortel VPN Router Configuration—Routing* (NN46110-504) provides instructions for configuring RIP, OSPF, and VRRP, as well as instructions for configuring ECMP, routing policy services, and client address redistribution (CAR).
- *Nortel VPN Router Using the Command Line Interface* (NN46110-507) provides syntax, descriptions, and examples for the commands that you can use from the command line interface.
- *Nortel VPN Router Configuration — TunnelGuard* (NN46110-307) provides information about configuring and using the TunnelGuard feature.

Hard-copy technical manuals

You can print selected technical manuals and release notes free, directly from the Internet. Go to www.nortelnetworks.com/documentation, find the product for which you need documentation, then locate the specific category and model or version for your hardware or software product. Use Adobe Reader to open the manuals and release notes, search for the sections you need, and print them on most standard printers. Go to the Adobe Web site at the www.adobe.com to download a free copy of the Adobe Reader.

How to get help

This section explains how to get help for Nortel products and services.

Finding the latest updates on the Nortel Web site

The content of this documentation was current at the time the product was released. To check for updates to the latest documentation and software for VPN Router, click one of the following links:

Link to	Takes you directly to the
Latest software	Nortel page for **VPN Router** software located at: www130.nortelnetworks.com/cgi-bin/eserv/cs/main.jsp?cscat=SOFTWARE&resetFilter=1&poid=12325
Latest documentation	Nortel page for **VPN Router** documentation located at: www130.nortelnetworks.com/cgi-bin/eserv/cs/main.jsp?cscat=DOCUMENTATION&resetFilter=1&poid=12325

Getting help from the Nortel Web site

The best way to get technical support for Nortel products is from the Nortel Technical Support Web site:

www.nortel.com/support

This site provides quick access to software, documentation, bulletins, and tools to address issues with Nortel products. From this site, you can:

- download software, documentation, and product bulletins
- search the Technical Support Web site and the Nortel Knowledge Base for answers to technical issues
- sign up for automatic notification of new software and documentation for Nortel equipment
- open and manage technical support cases

Getting help over the phone from a Nortel Solutions Center

If you do not find the information you require on the Nortel Technical Support Web site, and you have a Nortel support contract, you can also get help over the phone from a Nortel Solutions Center.

In North America, call 1-800-4NORTEL (1-800-466-7835).

Outside North America, go to the following web site to obtain the phone number for your region:

www.nortel.com/callus

Getting help from a specialist by using an Express Routing Code

To access some Nortel Technical Solutions Centers, you can use an Express Routing Code (ERC) to quickly route your call to a specialist in your Nortel product or service. To locate the ERC for your product or service, go to:

www.nortel.com/erc

Getting help through a Nortel distributor or reseller

If you purchased a service contract for your Nortel product from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller.

New in this release

The following section details what is new in *Nortel VPN Router Troubleshooting* for Release 7.0.

Features

See the following sections for information about feature changes:

- SNMP traps when an IP address pool reaches the configured threshold
- Automatic backups
- PCAP enhancements
- SNMP interface index enhancement

SNMP traps when an IP address pool reaches the configured threshold

You can configure the VPN Router so that a Simple Network Management Protocol (SNMP) trap sends a notification about an exhausted pool when a defined IP address pool reaches a configured limit. The list of IP address pools is periodically traversed and sends a trap if any pool is over the quota. You can set the limit and the default is 70%.

For more information about trap notification when the IP pool reaches a certain capacity, see "Configuring SNMP traps to send notification when an IP address pool reaches the configured threshold" on page 32.

Automatic backups

You can now back up a file or a directory, as well as trigger a backup, when a file changes. Previously, you could only back up system, configuration, and log files. You can use either the graphical user interface (GUI) or the command line interface (CLI) to configure automated backup.

You can also now use a Secure File Transfer Protocol (SFTP) client as well as File Transfer Protocol (FTP) to transfer backup files. You can use either the GUI or the CLI to activate SFTP.

For more information about automatic backups, see "Automatic backups" on page 52.

PCAP enhancements

You can now capture packets to disk files. Previously, you could capture packets to random access memory (RAM) only. There are five new commands for the command line interface (CLI) of the VPN Router. You must use the CLI to configure Packet Capture (PCAP).

For more information about PCAP enhancements, see "Capturing packets to disk file" on page 113.

SNMP interface index enhancement

Third-party network management systems (NMS) rely on interface index (IfIndex) numbers to monitor and gather statistics for devices through SNMP. These locally significant numbers are assigned to the physical and virtual interfaces on the device and enable the NMS to associate statistics with interfaces. Previously, when a branch office tunnel came up, it was assigned a dynamic IfIndex number. Only up tunnels were reported; any down tunnels were not reported.

With the enhancement, each branch office is assigned a static IfIndex, the IfIndex is saved in LDAP, and tunnels are reported even when they are down.

For more information about the IfIndex enhancement, see "RFC 1213—Network Management of TCP/IP-Based Internets MIB" on page 132.

Chapter 1
VPN Router administration

This chapter introduces administrator settings, tools, system configuration, and file management. It also includes information about SNMP traps.

Administrator settings

The VPN Router supports multiple administrators. You can assign different rights to allow or prevent administrative users from managing or viewing the VPN Router and user configuration information. You assign administrative privileges and rights on the Profiles > User > Edit window. The VPN Router also supports a primary administrator.

You can assign one of the following priviledge levels to the Manage Switch and Manage Users:

- None—This user does not have administrator rights to manage the VPN Router or to manage users; the user cannot view or manage configuration or user settings.
- View—This user has administrator rights to view (monitor) VPN Router configuration or user rights settings; however, the user cannot manage (change) them. This is the lowest level of administrator rights.
- Manage—This user has administrator rights to view (monitor) and manage (configure) other VPN Router configuration or user rights settings. This is the highest level of administrative rights.
- Add Subgroups is a check box that gives the user the authority to add and delete subgroups under the given directory when the user has View only authority with Manage Switch access rights.

You use the Administrator Settings window to do the following:

- change the primary administrator user ID and password
- control the Administrator Idle Timeout Setting for all administrators
- control the default language
- control the serial port settings

There is only one primary administrator. The primary administrator user ID and password combination do the following:

- provide the user with access to all windows and control settings
- allows access to the serial port and the recovery disk

Note: Once you set the primary administrator user ID and password, you must implement an Admin > Shutdown to save the new settings. Doing a reset (using the Reset button on the back of the VPN Router) does not save the settings.

You can change the primary administrator user ID and password on the Admin > Administrator window.

Lost user name and password—resetting the VPN Router to factory defaults

You can set the VPN Router back to the factory default configuration even if you do not know the administrator username and password. To do this:

1. Boot the VPN Router into recovery mode.
2. Open a browser to the management IP address of the VPN Router. You do not need a user name and password for this step.
3. Reset to factory default. After you reset to factory default, the administrator user name is admin and the password is setup.

Caution: Resetting to factory default removes all existing configuration information.

Dynamic password

Two types of administrative users exist on the VPN Router:

- one super-user (Administrator)
- as many administrative users as needed

There is dynamic password support for administrative users only. The Administrator still requires a static password.

RADIUS manages the dynamic password. The external RADIUS service acts as an intermediary between the VPN Router and the dynamic password authentication system.

To configure a dynamic password:

1. Select **Profiles > Users** and click **Add User**.
2. Under **Administration Privileges**, select **Dynamic Authentication**.

   When enabled, this forces administrative users to authenticate through RADIUS, which then forwards authentication credentials to a dynamic password authentication system, such as SecurID. The privileges associated with this administrative user are configured as before.

Tools

The VPN Router supports standard IP tools such as `ping`, `Traceroute`, and ARP `show` and `delete`. You access these tools through the Admin > Tools window.

The `ping` command generates an ICMP echo-request message, which any host can send to test node reachability across a network. The ICMP echo-reply message indicates that the node is successfully reached.

The Traceroute tool measures a network round-trip delay. Messages are sent per hop and the wait occurs between each message. If the address is unreachable, it uses the following formula to determine how long it takes for the Traceroute to time out.

```
maximum hops (30) x the wait timeout (5) x 3 seconds
```

The Address Resolution Protocol (ARP) dynamically discovers the low-level physical network hardware address that corresponds to the high-level IP address for a host. ARP is limited to physical network systems that support broadcast packets that are heard by all hosts on the network.

System configuration

Use the Admin > Config window to save the current or delete existing system configuration files. Additionally, you can select one of the previously named configurations and restore it as the current configuration.

File management

Use the Admin > File System > File System Maintenance window to navigate through the VPN Router file system. This window lists the devices (drives) and directories, which provides flexibility in viewing details of a file or directory and allows you to delete unnecessary files. For example, if you have problems performing an FTP transfer with a specific file, you can view the file details to learn its file size and when it was last modified for troubleshooting purposes. Additionally, you can toggle between hard drives when a backup drive is available.

Simple Network Management Protocol (SNMP)

Use the Admin > SNMP window to do the following:

- designate the remote SNMP management stations that are authorized to send SNMP Gets to the VPN Router
- enable specific MIBs

Note: A Nortel proprietary MIB is included on the Nortel CD. Click the CesTraps.mib file to load the MIB. See Appendix A, "MIB support," for a description of the CesTraps.mib.

SNMP counters measure packet attributes based on the outer IP header. The inner IP header does not contribute to the SNMP MIB counters. For example, the outer packet header can be good and counted, but if the inner packet header is corrupted, it does not contribute to the drop counter.

You can view the results of SNMP traps on the Health Check window.

Use the Admin > SNMP Traps window to generate SNMP Version 1 traps, based on MIB II. From the SNMP Traps window, you can do the following:

- designate the remote SNMP trap hosts that can receive traps from the VPN Router
- select the specific traps that you want the SNMP hosts to receive
- configure a trap to be sent only once

To enable traps, select one of the following trap groups from the SNMP Traps window:

- hardware
- server
- service
- standard IETF
- attack

The traps displayed on the group windows—in particular the Hardware Trap Configuration and the Service Trap Configuration windows—reflect the hardware and software available on your VPN Router. For example, if you have a VPN Router with no WAN interface cards, the traps for WAN interfaces do not appear on the Hardware Trap Configuration window.

Note: The Health Check window reports the results of many of the selections you make on the SNMP Traps window.

Most of the traps the VPN Router sends to configured trap hosts are also displayed on the SNMP Traps window. However, the SNMP Traps window does not display certain traps, including traps related to the status of branch office tunnels, due to space limitations. For example, when a physical interface status changes, many traps are sent reporting the failure of all the tunnels using this interface. The VPN Router sends all traps—whether they appear on the SNMP Traps window—to the SNMP management application specified as the trap destination.

Configuring SNMP traps to send notification when an IP address pool reaches the configured threshold

You can configure the VPN Router to make an SNMP trap send a notification about an exhausted pool when a defined IP address pool reaches a configurable limit. The VPN Router periodically traverses the list of IP address pools and sends a trap if any pool is over the quota. You can set the limit and the default is 70%.

To configure an SNMP trap to send a notification about an exhausted IP address pool:

1. To capture the traps, you must first define and enable a target host. To do that, select **Admin > Snmp Traps**.

   The Admin > SNMP Traps window appears.

Figure 1 Admin > SNMP Traps window

Trap Hosts

Enable	Host Name or IP Address	Community Name	Status
1 ☑	192.167.120.19	test1	Operational
2 ☐			
3 ☐			

2 Enter a host name or IP address in the **Host Name** or **IP Address** text box.

3 Enter a name in the **Community Name** text box.

4 Click **Enable**.

5 Click **OK**.

6 Under the **Trap Groups** section on the **SNMP Traps** window, click **Configure** beside **Service**.

7 Click **OK**.

The Service Trap Configuration window appears.

8 Click **Enable** for **User IP Address Pool**.

9 Click **OK**.

The Address Pool window appears.

10 In the **Address Pool Exhausted Amount** text box, enter the limit of an IP pool that triggers an SNMP trap. The range is from 50 to 99 and the default is 70.

11 In the **Address Pool Blackout Interval**, enter in seconds the amount of time before an address is available for reissue. The default is 10.

12 Click **OK**.

You can also use the CLI to configure an SNMP trap to send a notification about an exhausted IP address pool.

To configure the interval:

```
CES(config)#$enable traps service ip-pool-exhausted interval
<hh:mm:ss> [send-one]
```

To configure the amount:

```
CES(config)#ip local pool exhausted-amount <amount>
```

Chapter 2
Status and logging

The Status windows show which users are logged on, their traffic demands, and a summary of the VPN Router's hardware configuration, including available memory and disk space.

The status windows include:

- Sessions
- Reports
- System
- Health check
- Statistics
- Accounting

The VPN Router has the following logs that provide different levels of information:

- Security log
- Config log
- System log
- Event log

The logs are stored in text files on disk and they indicate what happened, when, and to which user (IP address and user ID).

The event log captures real-time logging over a relatively short period of time (for example, the event log can wrap 2000 possible entries in minutes). The system log captures data over a longer period of time, up to 61 days.

Most events are sent to the event log first. Significant events from the event log are sent to the system log. (Not all data that the system log saves comes from the event log.) From the system log, the VPN Router filters security entries for the security log and configuration entries for the configuration log. You can use the different log options to write specific event levels to the log files and view them, including:

- Normal
- Urgent
- Detailed
- All

Sessions

You can monitor which users are tunneled into the VPN Router, when they logged in, and the number of bytes and packets they transmitted or received. Additionally, you can see selected session details, and you can log off users.

Once a session is connected, detailed information about the connection is available from the Status > Sessions window. This window lists all connected sessions, including administrative sessions. As well as statistics, this information contains what encryption was negotiated and the SOIs of the security associations. Click the appropriate buttons beside each session to either log out of the session or view detailed information about it.

Reports

Use the Status > Reports window to view system and performance data in text or graphical format. You generate reports in an on-screen tabular format, and you can import the reports into a spreadsheet or database through the comma-delimited format.

At midnight (12:00 a.m.), the data collection task performs summary calculations and rewrites history files, along with other management and cleanup functions. To perform this task, leave the VPN Router running overnight. The VPN Router must be running at midnight to generate a historical graph for the day.

If you have multiple VPN Routers throughout the world, use the Greenwich Mean Time (GMT) standard to synchronize the various log files so that the timestamps are directly comparable.

System

The Status > System window shows the VPN Router's up time, software and hardware configurations, and the current status of key devices. When there is a pending shutdown or an Internetwork Packet Exchange (IPX) public network address change that requires a reboot, the top of this window list these events.

Health check

The Status > Health Check window provides an overall summary of the current state of the VPN Router's hardware and software components at a glance. It lists all aspects of unit operation, with the most critical information to check at the top of the window. Click the link on the right side of the window to go directly to the window for configuration of that feature.

Statistics

The Status > Statistics window provides many subwindows with a wealth of general and diagnostic information about the system hardware, software, and connections. Much of the information is specifically designed for Nortel Customer Support personnel to assist them in diagnosing problems. Some windows, however, such as the LAN Counters, Interfaces, and WAN Status windows, provide you with traffic information. Use the Status > Statistics window to see text displays of system-level statistics to resolve lower-level problems with connections. These displays are similar to command-line output from the operating system.

In normal operation and routine troubleshooting, it is not necessary to examine many of these windows. Some of the information, such as routing information, is also available through other windows, such as System > Routing.

Accounting

The accounting log provides information about user sessions. This log provides last and first names, user ID, tunnel type, session start and end dates, and the number of packets and bytes transferred. You can use most of these fields to search the log.

Accounting records

Accounting records are detailed logs that record the various activities performed by the VPN Router. The logs are directly available from the management interface and you can export them to other applications for additional processing. The VPN Router gathers and stores data about the current state of the VPN Router and the connections. The data is stored in files on the VPN Router's hard drive.

- Session Status: RADIUS Accounting—the VPN Router stores copies of RADIUS accounting records. These records, which you can retrieve through FTP or send to a RADIUS server, contain information about each VPN session initiated to the VPN Router.
- System Data: Data Collection Task—The data collection task runs on the VPN Router and gathers data about the system's status. Each minute, the task captures data and writes it to a data file. You use the information the task captures to create the graphs and reports available from the Status > Reports window.

Note: The results of accounting record searches can be incorrect if another administrator initiates a new search before the first search is completed. Therefore, ensure that not more than one administrator is searching accounting records at one time.

The data collection system stores records in text-based files stored in the system/dclog subdirectory. The system stores the most recent 60 days of data. The system stores daily files, summary files, and summary history files. Ongoing administration tasks include monitoring the configuration files, backing up and restoring the VPN Router or the LDAP database, and upgrading images and clients.

Note: The VPN Router does not sort accounting records and displays them in a random order.

RADIUS accounting

The VPN Router stores copies of RADIUS accounting records and normally sends these records to a standard RADIUS Accounting server. To configure a RADIUS accounting server, select Servers > RADIUS Acct.

To view the information in the standard RADIUS accounting records, select Status > Accounting. The VPN Router creates a file for each day and keeps the most recent 60 days of data, storing them in the SYSTEM/ACCTLOG directory.

Note: The Status > Accounting window can provide misleading branch office session information because it displays rekeyed branch office tunnels as separate entries. The VPN Router does not send RADIUS accounting records to external servers for branch office connections.

Data collection task

The VPN Router runs the data collection task runs and gathers data about the system's status. The task captures data every minute and writes it to a data file. The VPN Router uses the information this task captures to create the graphs and reports available from the Status > Reports window and stores this information in text-based files in the system/dclog directory. The VPN Router creates the following types of files in the this directory:

- Daily files that contain interval records gathered every 60 seconds. These values are interval values and there is a file for each day (for example 20040622.DC).

- Summary file that always has exactly five records containing summary data in a file called summary.dc. These values are used to give historical graphs and reports about specific values.
- Summary history file that contains records representing cumulative daily data for the most recent 60 days in a file called summs.dc. Each day's summary is represented by four records. These records are for the current, total, average, and maximum values for the day.

A data collection record consists of 16 pairs of entries for each data collection object currently being collected. Each value pair consists of a Field ID and an integer value. The following is a sample data collection record:

0-930057960,1-3,2-3,3-0,4-0,5-0,6-0,7-0,8-0,9-0,10-56,11-76,12-1,13-11021,14-40,15-38,16-0

Table 1 lists the field IDs that are currently implemented.

Table 1 Field IDs for data collection records

Field identification	Collected field value	Description
0	TIMESTAMP	Seconds since Jan 1, 1970 - 00:00:00 Hours
1	TOTALSESSIONS	Summary of all sessions
2	ADMINSESSIONS	Number of Admin sessions
3	PPTPSESSIONS	Number of PPTP sessions
4	IPSECSESSIONS	Number of IPsec sessions
5	L2FSESSIONS	Number of L2F sessions
6	L2TPSESSIONS	Number of L2TP sessions
7	IPADDRESSUSE	Percentage of total IP addresses in use
8	CPUUSE	Unfiltered CPU usage measurement {integer representing a percent between 0 and 100}
9	CPUSMOOTH	Filtered CPU usage measurement {integer representing a percent between 0 and 100}

Table 1 Field IDs for data collection records (continued)

Field identification	Collected field value	Description
10	MEMUSE	Filtered memory usage measurement {integer representing a percent between 0 and 100}
11	BOXPACKETSIN	Number of Inbound Packets
12	BOXPACKETSOUT	Number of Outbound Packets
13	BOXBYTESIN	Number of Inbound bytes
14	BOXBYTESOUT	Number of Outbound bytes
15	BOXDROPPEDPACKETS	Number of discarded packets
16	FAILEDAUTHATTEMPTS	Number of failed authentication attempts
17	LASTFIELDID (this field is never written to data record)	

Logs

The VPN Router has several logs that provide different levels of information. The logs are stored in text files and indicate what happened, when the event occurred, and the IP address and user ID of the person causing the event.

Event log

The event log is a detailed recording of all events that take place on the system. These entries are not necessarily written to disk, as with the system log. The event log retains all system activity in memory, but you must configure the system to save the event log either automatically or in a specified file.

The event log includes information on tunneling, security, backups, debugging, hardware, security, daemon processes, software drivers, and interface card driver events.

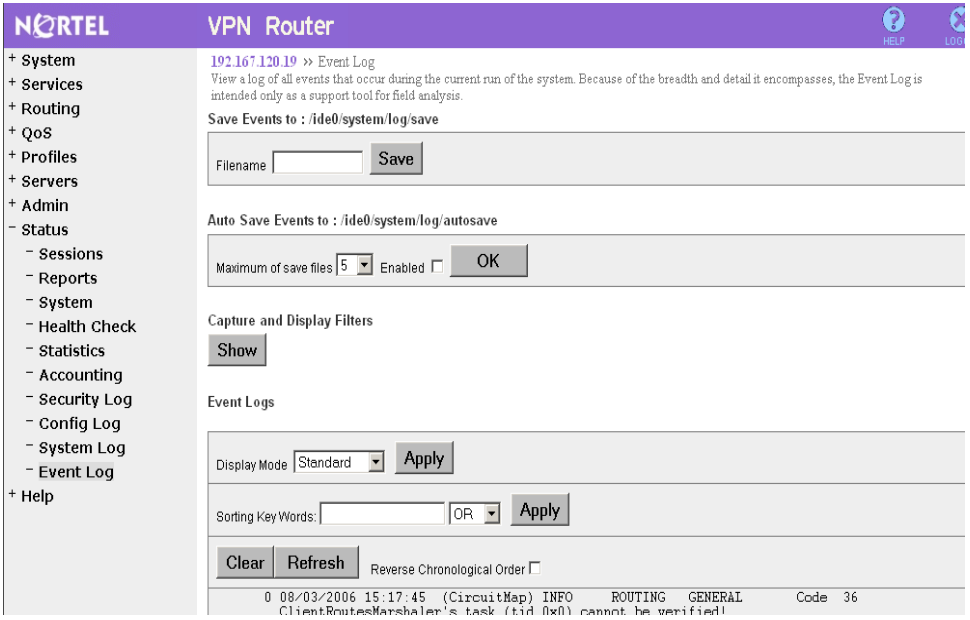
As the event log adds information, the oldest entries are overwritten. The event log retains the latest 2000 entries and discards old entries when it is refreshed.

To configure event logging:

1 Select **Status > Event Log**.

The Event Log window appears. (Figure 2)

Figure 2 Event logs

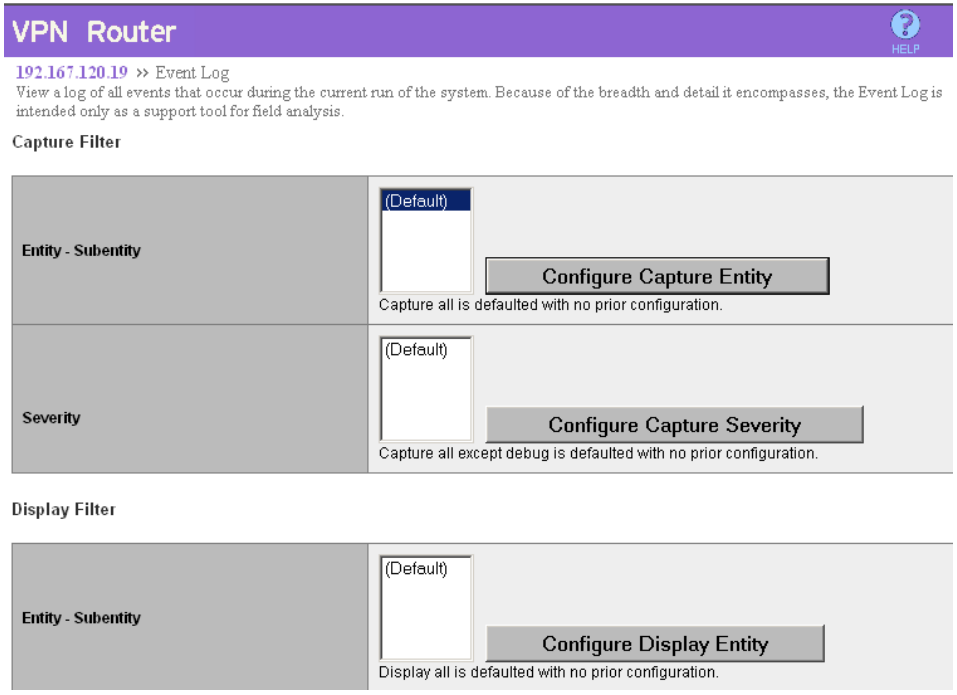


2 In the **Save Events to** section, enter a filename and click **Save** to manually save the current event log at any time.

3 In the **Auto Save Events to** section, select the maximum number of files that you want to save and click **Enabled** to automatically save the event log.

4 The Capture and Display filters are hidden by default. Click **Show** to view or configure the capture and display filter capabilities. (Figure 3)

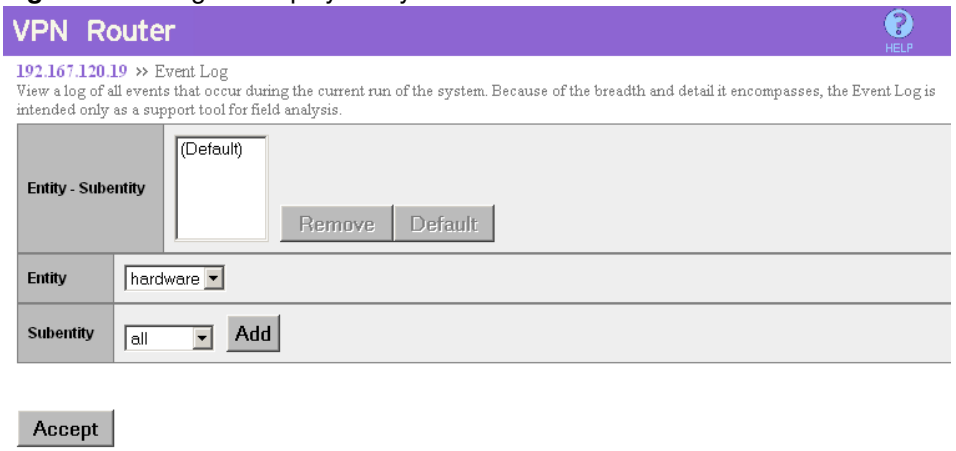
Figure 3 Capture and display filters



5 You configure the capture filter and display filter using Entity-Subentity or Severity. To configure the capture filter or display filter:

a Click **Configure Capture Entity** or **Configure Display Entity**. Figure 4 shows the Configure Display Entity window.

Figure 4 Configure Display Entity



b Select an **Entity** from the list.

c Select a **Subentity** from the list.

d Click **Add** to add the selected entity-subentity pair to the filter.

e Click **Accept** to complete your changes to the filter.

f Click **Remove** to delete a selected item from the list.

g Click **Configure Capture Severity** or **Configure Display Severity** to configure the level of severity that you want to display on the window from the log.

h Select a severity message from the Severity list and click **Add** to add it to the Captured Severity list or Displayed Severity list. Select **Remove** to remove a selected item currently in the Severity list.

i Click **Accept** to save any changes you make.

6 To sort the log based on key word matches, enter a list of key words, separated by a space or a comma.

7 Select the type of match you want. Select **AND** to match all key words. Select **OR** to match any key words.

8 Click **Clear** to clear the entire log. Only Administrators can clear the log.

9 Click **Refresh** to display new log entries.

10 Click **Reverse Chronological Order** to log in reverse chronological order.

System log

The system log contains all system events that are considered significant enough to be written to disk, including those displayed in the configuration and security logs. Events that appear in the system log include:

- LDAP activity
- configuration activity
- server authentication and authorization requests

The following is the general format of the log entries:

- time stamp
- task that issued the event (tEvtLgMgr, tObjMgr, tHttpdTask)
- number that indicates the CPU that issued the event (0=CPU 0, 1=CPU 1)
- software module that issued the event
- priority code assignment (number in brackets) (for a description of these codes, see "Event log" on page 41)
- indicates that the packet matched the rule in the listed section
- indicates the matching packet source, destination, protocol, and action configured for that rule

The following example shows a system log:

11:29:31 tEvtLgMgr 0 : CSFW [12] Rule[OVERRIDE 1]Firewall: [192.32.250.204:1024-10.0.18.12:2048, icmp], action: Allow

Security log

The Security log records all activity about system or user security. It lists all security events, both failures and successes. The events can include:

- authentication and authorization
- tunnel or administration requests
- encryption, authentication, or compression
- hours of access
- number of session violations

- communications with servers
- LDAP
- Remote Authentication Dial-In User Service (RADIUS)

Configuration log

The Configuration log records all configuration changes. For example, it tracks adding, modifying, or deleting the following configuration parameters:

- group or user profiles
- LAN or wide area network (WAN) interfaces
- filters
- system access hours
- shutdown or startup policies
- file maintenance or backup policies

Chapter 3
Administrative tasks

This chapter describes administrative tasks that help you operate the VPN Router. These tasks provide details on scheduling backups, upgrading the software image, saving configuration files, performing file maintenance, creating recovery diskettes, and system shutdown.

Shutdown

You use the Shutdown options to shut down immediately, to wait until current users are logged off, or to wait until a designated time. A normal shutdown safely terminates connections so that no data is lost, compared with a spontaneous loss of power.

Additionally, you can select whether to power off or restart after shutdown and which configuration file to use upon restarting. To conduct an orderly shutdown, you can disable new logins, and you can disable logins after the shutdown to perform system maintenance.

Always use the Admin > Shutdown window to shut down the system rather than the Power or Reset buttons on the back of the VPN Router. This ensures the integrity of your file system.

Note: After performing a system shutdown, click **Reload/Refresh** to see the latest VPN Router information.

Recovery

In the unlikely event that there is a hard disk crash, use the Recovery window to configure a recovery diskette to restore the software image and file system to the hard drive of the VPN Router. The recovery diskette is included with your VPN Router. You can also use this window to create additional copies of the recovery diskette, as well as to reformat a diskette.

Note: The VPN Router 1000, 1010, 1050, and 1100 do not have a floppy drive in the unit. Although the VPN Router 600 does not have a floppy drive, the recovery image is stored in a PROM and you can invoke it by pressing a switch on the back of the unit.

Accessing the diskette drive

If the VPN Router has a front cover, you must remove it to gain access to the diskette drive. See the installation guide for details on how to remove the front cover. Booting the VPN Router with the recovery diskette does the following:

- reformats the hard disk
- allows FTP access to the hard disk
- restores the previously backed-up software image and file system from a backup host to the hard disk
- downloads a new factory default software image and file system from a file server to the hard disk

These utilities are accessed throught Hypertext Transfer Protocol (HTTP) after it is booted from the recovery diskette.

Using the recovery diskette

To use the recovery diskette:

1. Remove the VPN Router's front cover.
2. Insert the recovery diskette into the drive and press **Reset** on the back of the VPN Router.

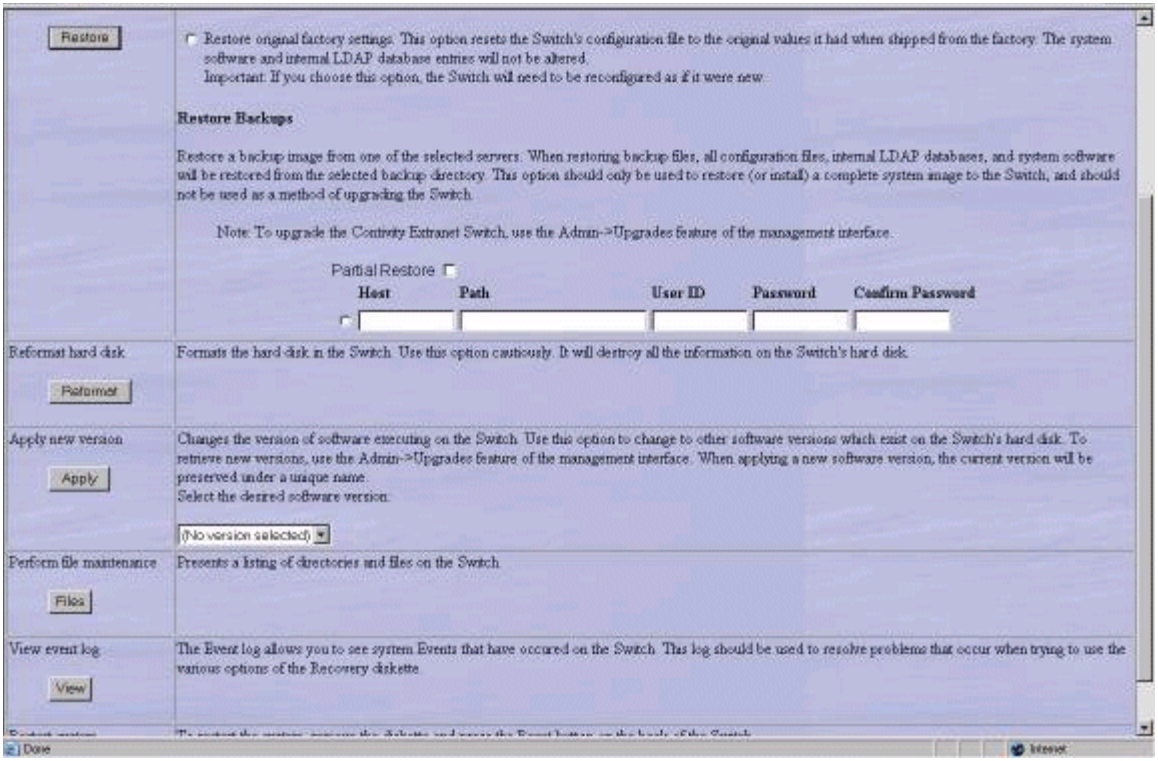
This supplies a minimal configuration utility so that you can view the VPN Router from a Web browser.

3 In the Web browser, enter the management IP address of the VPN Router.

The Recovery Diskette window appears, which you can use to:

— restore the factory default configuration or the backup configuration
— reformat the hard disk
— apply a new software version to the VPN Router
— perform file maintenance
— view the Event log
— restart the system

Figure 5 Recovery Diskette window



4 To restore the factory default configuration or the backup configuration, select the hard disk drive to which you want to restore the system files, **either ide0** (drive 0) or **ide1** (drive 1), and then do one of the following:

- Select **Restore Factory Configuration**, then click **Restore** to return the VPN Router to its original factory default configuration. This erases data contained in flash memory and also in the configuration file.

Warning: Selecting this option requires you to rebuild your entire configuration from scratch.

An online message specifies the result of the Factory Configuration reset action.

- Click **Restore** to restore the VPN Router's previously backed-up configuration. If you previously chose to automatically backup the file systems, then the backup server host (or IP address) and path name, user ID, and password appear in the table.

  Check **Partial Backup** if you want to restore the configuration files, log files or system files from a previous partial backup. The system restores the corresponding directory or files.

  Select the preferred backup server. The latest backup copy of the file system, including software image and configuration files, is restored to the hard drive of your VPN Router.

  You can use the same backup server for multiple VPN Routers. Each VPN Router creates a unique directory based on its serial number. The following example shows the host, path, and serial number (where the serial number [SN] is five digits):

  ```
  C:/software/backup/v101/SN01001
  ```

  You can use the serial number to differentiate backup configurations from multiple VPN Routers that are saved on the same backup server. The serial number uniquely identifies each VPN Router's backup data.

  If you did not configure automatic backup server locations, use the blank row in the server backup field to manually enter a backup server.

Note: FTP servers are often different, so check for information in your server documentation about setting paths that can help you with the upgrade procedure.

You can use a new factory default software image and file system to restore the VPN Router's hard disk. Specify the name or address and path of the network file server onto which the software from the Nortel CD is installed.

Note: This restores the disk to an operable but clean condition (for example, configuration values are at factory defaults).

To view the serial number when the VPN Router is operational, select **Status > System**. The Serial Number is also on the bar code label on the back of the VPN Router.

5 Click **Reformat Diskette** if you must reformat the hard disk for one of the following reasons:

— cannot restore your configuration due to problems that are not caused by the network or the file/backup server from which the file restoration is retrieved

— want to reconfigure the VPN Router from scratch

— install a new disk

Caution: Selecting this option completely wipes out anything that was stored on the hard disk.

An online message indicates whether the reformatting of the hard disk is successful.

6 Select the image version that you want to activate from the list of available software image and file systems stored on the hard disk.

7 Click **Apply** to apply the new version and reboot automatically. Changes are active. The VPN Router boots to that version until changed.

8 Click **Files** to bring up the **File Maintenance** window, which allows you to view the entire hard disk file system.

9 Click **View** to display the **Event Log** beneath the Recovery Diskette window. This is especially useful if a Restore operation fails.

10 To set the boot disk, select either **ide0 (drive 0)** or **ide1 (drive 1)**.

11 Click **Set**.

12 Click **Synchronize** to immediately synchronize the primary and secondary disks. Thereafter, the disks automatically synchronize every hour.

13 From the list, select the drive on which you want to upgrade the system boot software.

14 If the system boot sector is corrupted, click **Upgrade** to rewrite the boot software to the hard disk.

15 To restart the system, remove the diskette and press **Reset** on the back of the VPN Router. Reposition your Web browser to the Management IP address, and select **Reload** or **Refresh** from your browser menu to access the management window of the software running on the hard disk.

Note: You cannot use this procedure for the VPN Router 1000 due to the lack of a floppy drive in the unit. Although the VPN Router 600 does not have a floppy drive, the recovery image is stored in a PROM; you can invoke it by pressing a switch on the back of the unit.

Automatic backups

The VPN Router checks at regular intervals to see whether there are any system file changes. When system file changes occur, they are written to each of the backup servers. The VPN Router backs up all of the system files the first time; thereafter, it backs up only the files that change.

Note: Any changes made to backup parameters while a backup is in process do not take effect until the currently running backup is complete.

The VPN Router does not begin a backup for at least 5 minutes after rebooting to allow all resources to start operating. This delay occurs even if you request that a backup start immediately. Use the Admin > Auto backup window to configure regular intervals or specific times when your system files are saved to designated host backup file servers. You can designate up to three backup file servers.

You must create a directory on the File Transfer Protocol (FTP) or Secure File Transfer Protocol (SFTP) server before running automatic backup. If you specify a path in the Admin > Auto backup window and the directory does not exist on the FTP or SFTP server, the automatic backup fails and *The host path does not exist* message is logged in the Event log.

Note: Automatic backup does not recognize a path beginning with the slash (/) character as it did in previous releases.

Using the GUI for automatic backup

You can use the CLI to transfer backup files through SFTP or to trigger a backup when a file or directory changes.

Transferring backup files through SFTP

You can now use an SFTP client to transfer backup files. Previously, you could use only FTP.

Note: To transfer backup files using SFTP, you must first configure a remote Secure Shell (SSH) server.

To transfer backup files using sftp:

1. Select **Admin > Auto Backup**.
2. In the **Automatic Backup File Servers** section, click the **sftp** check box for a particular server. FTP is the default.

Triggering a backup when a file or directory changes

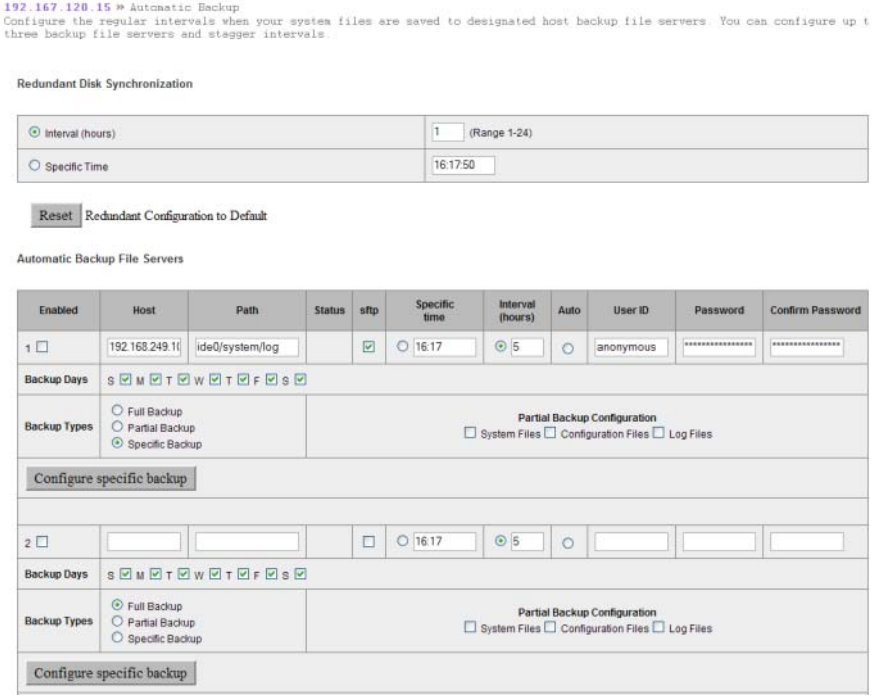
You can trigger an automatic backup when a new file is created in a particular directory, or when a file or a directory changes. The VPN Router checks at regular intervals to see whether changes occur. These changes are written only to the backup server you specify. You can optionally delete that file after the backup is complete.

To enable automatic backup when a file or a directory changes:

1 Select **Admin > Auto Backup**.

The Automatic Backup window appears. (Figure 6)

Figure 6 Automatic backup window



2 Click **Enabled** to enable the associated host backup file server.

3 Enter the backup file server host name or IP address.

4 Enter the backup file server path, for example, test.

5 Click **sftp** to transport the backup files using an SFTP client. Do not select SFTP if you want to use the default, FTP.

Note: To transfer backup files using SFTP, you must first configure a remote SSH server.

6 To back up at a specific time, click **Specific Time** and enter the time that you want the backup to occur in the **Specific Time** text box.

7 To back up at certain intervals of time, click **Interval** and in the **Interval** text box specify in hours the time period after which the system automatically backs up changed files. The minimum interval is 1 hour, and the maximum is 8064 (336 days). The default is 5 hours.

8 If you chose either the Specific Time option or the Interval option, select the **Backup Days** you want to trigger the specific backup.

9 Click **Auto** if you want to back up files only when the files change.

Note: Because the auto trigger works only with the Specific backup option, select **auto** if you want to trigger the backup of a file found in the path of the Specific backup whenever there is a change in a file.

10 In the **User ID** text box, enter the user ID that is required for either FTP or SFTP logon to the backup file server.

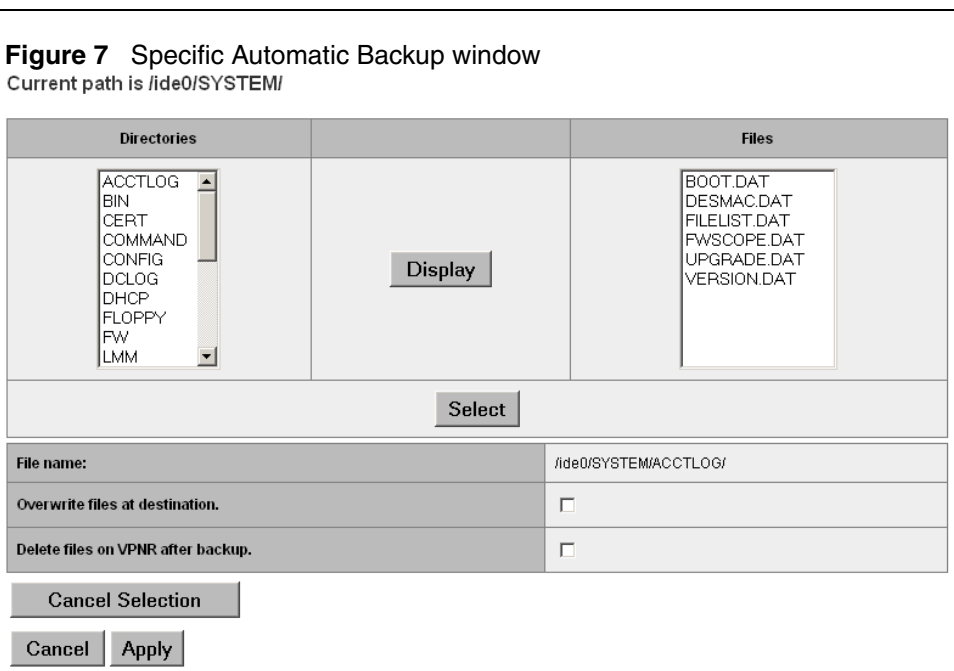
11 In the **Password** text box, enter the password that is required for either FTP or SFTP logon to the backup file server.

12 In the **Confirm Password** text box, reenter the password that is required for either FTP or SFTP logon to the backup file server.

13 Click **Configure Specific Backup**.

The Specific Automatic Backup window appears. (Figure 7)

Figure 7 Specific Automatic Backup window



14 To see the list of files for a directory, highlight the name of a directory and click **Display**.

The files for that directory appear in the Files list.

15 To select the file that you want to back up, highlight the name of the file and click **Select**.

The name of the file you selected appears beside File name.

16 To select the directory that you want to back up, highlight the name of the file and click **Select**.

17 To overwrite a file, click **Overwrite files at destination**.

18 To delete files after they are backed up, click **Delete files on VPN Router after backup**.

19 Click **Apply** to save the changes.

20 Select **Admin > Auto Backup**.

21 In the **Backup Types** section of **Automatic Backup File Servers**, click **Specific Backup** for the server of your choice.

22 Click **Backup** to run the backup to each enabled server now. This action also synchronizes the hard disk drives when there is more than one hard drive in a device. Otherwise, the hard disks synchronize automatically every 60 minutes.

A new window appears with the backup information at the top of the window.

23 Click **OK**.

After entering the automatic backup file server information, click on the window and press the keys **Alt** and **Print Scrn** (Screen) to save the screen image to a buffer. Next, paste the image into a file (for example, into Microsoft* Word) and keep it as a record of the backup file servers that you are using.

Using the CLI for automatic backup

Version 7.00 provides CLI commands for backing up a list of files and directories, or directories, that changed on the VPN Router. The CLI command `exception backup` includes the following parameters:

- `specific`—backs up specific files or directories only
- `file-path`—backs up additional files or directories in a particular file path
- `auto`—backs up the changes only to any file in a file path
- `overwrite`—overwrites existing files on the host
- `delete`—deletes files on the VPN Router after backup
- `sftp`—uses SFTP to transfer the backup files

For more information about the command parameters, see *Nortel VPN Router Using the Command Line Interface*.

Note: To transfer backup files using SFTP, you must first configure a remote SSH server.

The following sections describe how to use the CLI commands. You must enter the commands from CLI Global Configuration Mode. For more information about the Global Configuration Mode, see *Nortel VPN Router Using the Command Line Interface.*

Backing up specific files and directories

To back up specific files and directories, with the option to delete them after backup, enter:

```
exception backup advanced {1 | 2 | 3} {full | partial | specific
[<file-path> ] [overwrite] [delete]}
```

For example, to set the target of the exception backup to a directory /ideX/system/log, enter:

```
CES(config)# exception backup advanced 1 specific /ideX/system/log/
overwrite
```

Stopping the backup of specific files and directories

To stop the backup of specific files and directories, enter:

```
no exception backup advanced {1 | 2 | 3} {full | partial |specific
[overwrite] [delete]}
```

For example, to stop the previous exception backup, enter:

```
CES(config)# no exception backup advanced 1 specific
```

Backing up changes to specific files or directories

To back up the changes for specific files or directories on a particular server, use the auto option. The auto option works only with the *specific* backup type. Enter:

```
exception backup {1 | 2 | 3} {<ip-address> | <host-name>}
[<file-path>] auto username <user-name> password <password>
```

For example, to back up the files that changed on backup server number 1, enter:

```
CES(config)# exception backup 1 10.2.5.68 auto username admin
password setup
```

Stopping the backup of changes to specific files or directories

To stop backing up the changes for specific files or directories for a particular server, enter:

```
no exception backup advanced {1 | 2 | 3} specific
```

For example, to stop backing up files that changed in backup server number 1, enter:

```
CES(config)# no exception backup advanced 1 specific
```

Using SFTP to transfer backup files

To use SFTP to transfer the backup files, from CLI Global Configuration Mode, enter:

```
CES(config)# exception backup {1 | 2 | 3} sftp
```

For example, to use SFTP to back up the files that changed in backup server number 2, enter:

```
CES(config)# exception backup 2 sftp
```

Stopping the transfer of backup files using SFTP

To use SFTP to stop the backup of files, from CLI Global Configuration Mode, enter:

```
CES(config)# no exception backup {1 | 2 | 3} sftp
```

For example, to use SFTP to stop the transfer of files that changed in backup server number 2, enter:

CES(config)# **no exception backup 2 sftp**

For more information about the command parameters, see *Nortel VPN Router Using the Command Line Interface*.

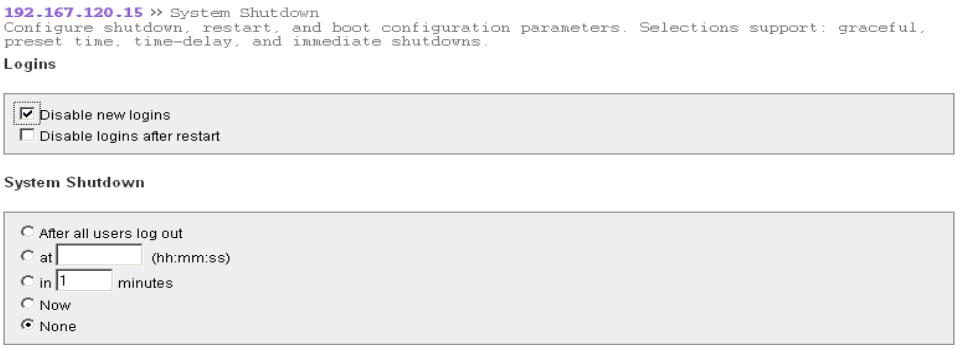
Disabling new logins

You can prevent clients from connecting to the VPN Router without affecting the users currently connected by using this feature to disable new logins. When new logins is disabled, no new IPsec connections are established.

To disable new logins:

1. Select **Admin > Shutdown**.
2. Click **Disable new logins**. (Figure 8)

Figure 8 Disable new logins



If you do not want to reboot the switch after you disable new logins, click **None** in the **System Shutdown** section.

To disable new logins using the CLI, enter the following command:

```
CES# reload [at <hh:mm>] [boot-drive] [boot-normal | boot-safe]
[config-file] [power-off | restart] disable-logins
```

Upgrading the software

To upgrade the VPN Router, download the latest Nortel software using the File Transfer Protocol (FTP). Because FTP servers are often different, check your server documentation for information about setting paths that can help you with the upgrade procedure.

You can download the latest software from:

- Nortel Web site
- your own FTP site if you previously downloaded the software from the Nortel FTP site
- Nortel software CD

If an FTP server does not use standard FTP port numbers, you cannot use it to download FTP servers for Nortel software. For more information, contact Nortel Customer support.

Note: You cannot upgrade the software through a branch office tunnel that is translating the management address with dynamic Network Address Translation (NAT).

If file retrieval fails, the VPN Router retries the transfer. The WU-FTP server does not support this behavior and can cause the negotiation to fail. Explore connectivity issues as the first possible level of failure.

Checking available disk space

Nortel recommends that you keep a maximum of four software versions on the system disk. If four versions already exist on the Admin > Upgrade window, you must delete one version before you download another version.

To remove a software version:

1. Select **Admin** > **File System**.
2. Select the Hard Drive (/ide0/).
3. Click **Display**.

   A list of the versions on the VPN Router appears.

4. Click the version you want to view and click **Details**. When the window refreshes, you see the directory that you just selected. Click **Delete Directory**.

   A new window appears verifying this is what you intended to do. If there is more then one image on the hard drive, follow the above process to delete all the older image upgrades.

Before you upgrade your software, use one of the following methods to make sure there is enough available disk space:

- From the GUI, select **Status > Statistics > File System**. The last line lists the free space on the disk.
- From the CLI, enter **show status statistics system file-system**. The last line lists the free space on the disk.

Note: Some restrictions apply if you have a VPN Router 1010, 1050, or 1100. To export the configuration and LDIF files from the device, FTP the files to a server and view the file size. If the combined size of the LDIF and configuration files is less than 1Mbyte, you can upgrade to the latest version. The VPN Router 1010, 1050, and 1100 allow a maximum of two images on the flash disk. You must remove the second image (if present) prior to downloading an upgrade.

Creating a control tunnel to upgrade from a remote location

To upgrade the software on a VPN Router from a remote location, you must create a user control tunnel at the physical location of the VPN Router. User control tunnels provide secure access to a remote VPN Router so that you can manage it over a network.

You can create a user control tunnel through the serial port on the VPN Router or with the GUI. When you create a user under the group Control Tunnels, it automatically becomes a control tunnel user. To create a user control tunnel through the serial port:

1. Connect the serial cable (supplied with the VPN Router) from the VPN Router's serial port to a terminal or to the communications port on a PC.
2. Turn on the PC or the terminal.
3. On the PC, start HyperTerminal* or another terminal emulation program and press **Enter**.

   The Welcome window appears.

4. Enter the VPN Router administrator user name and then the password.

   The serial main menu appears.

5 Type **5** (`Create A User Control Tunnel (IPsec) Profile`).

6 Enter the user ID that you plan to use to log in remotely to the VPN Router.

7 Enter the password that you plan to use.

8 Enter the password again.

9 When you are prompted for an IP address, you can enter a static IP address that is assigned to the user during the control tunnel connection. If an address pool is configured, you do not need to enter a static IP address.

Go to the next section, "Creating a recovery diskette" on page 63.

Creating a recovery diskette

Before you upgrade the VPN Router, create a recovery diskette. You must perform this task on the VPN Router itself. To create a recovery diskette:

1 Insert a blank diskette into the floppy drive.

2 Select **Admin > Recovery** and click **Create Diskette**.

Note: If you have a diskless system, for example, a VPN Router 1100, the recovery image is stored in flash memory.

Backing up system files

Before you upgrade, verify that a recent automatic backup was done in one of the following methods:

1 If you are located at a remote site, connect to the VPN Router through a tunnel (branch office or user control).

2 Select **Admin > Auto Backup** and ensure that a recent automatic backup was performed to an FTP server.

3 If a recent backup does not exist, use the following steps to create the backup on the **Automatic Backup** window:

   a Enter an IP address or host name, path, interval, FTP user ID, and password.

b Click **Backup** to start the backup immediately.

This saves your entire hard drive, including the LDAP and configuration files.

Retrieving the new software

For Version 4.80 and later, the VPN Router release image is available in a compressed .zip file so that each individual file does not download separately. The VPN Router decompresses the image as it retrieves it. You must then apply the new image.

To use the compressed zip file:

1 Place the zip file (for example, V04_80.114.tar.gz) on the FTP server that you are using for the upgrade.

```
D:\ftp>dir
Volume in drive D has no label.
Volume Serial Number is 9B29-6769
Directory of D:\ftp
06/18/2003  01:20p      <DIR>          .
06/18/2003  01:20p      <DIR>          ..
06/18/2003  06:53a          31,779,808 V04_80.069.tar.gz
```

Note: Do not attempt to create your own zip archive. Use the .tar.gz file distributed by Nortel.

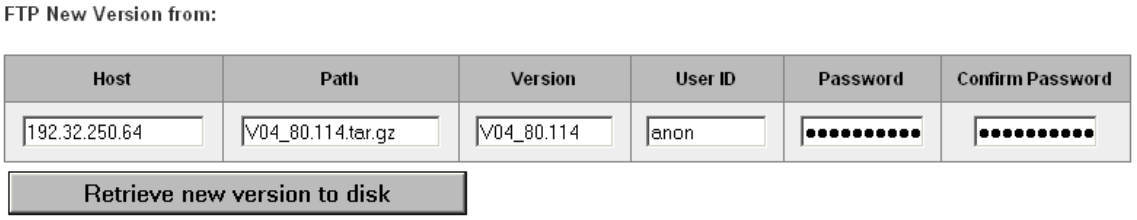
2 Select **Admin > Upgrades**.

3 Fill in the following fields on the **Upgrades** window:

- Host: type the IP address or the name of the machine where the new software is located.
- Path: type the directory path location of the new software. The path value is the relative location of the .gz file from the FTP root in the directory. In the example below, the V04_80.069.tar.gz file is located at the root of the FTP directory.
- Version: type the exact name of the code that you are upgrading to (for example, V04_80.114).

Figure 9 shows an example upgrade to V04_80.114 from server 192.32.250.64. The file V04_80.114.tar.gz must be located at the root of the FTP directory.

Figure 9 FTP menu example



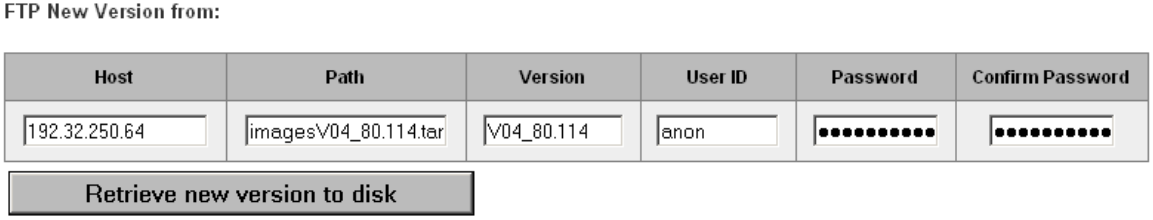
When you FTP to the FTP server from another PC, you see the location of the file.

```
D:\ftp>ftp 192.32.250.64
Connected to 192.32.250.64.
220 entrust-ca Microsoft FTP Service (Version 2.0).
User (192.32.250.64:(none)): anon
331 Password required for anon.
Password:
230 User anon logged in.
ftp> ls V04_80.069.tar.gz
200 PORT command successful.
150 Opening ASCII mode data connection for file list.
V04_80.069.tar.gz
226 Transfer complete.
ftp: 19 bytes received in 0.62Seconds 0.03Kbytes/sec.
ftp>
```

If you want to locate the tar file in a subdirectory on the FTP server, you must prepend the subdirectory to the path.

Figure 10 shows an example with the tar file located in the images directory under the FTP root.

Figure 10 FTP menu with subdirectory example



- User ID: type the login ID required to gain access to the FTP server where the new VPN Router software is located.
- Password and Confirm Password: type the password (twice) that corresponds to the user ID you just entered.

4 After filling in all the required fields, click **Retrieve new version to disk**. The New version retrieval window displays the progress of your download and indicates whether the retrieval was successful.

5 When the retrieval of the zipped image is complete, you can apply the new version from the list.

Before completing the upgrade

During the Apply process of upgrading to a new version of code, the VPN Router copies files from your current version of software to the new version before the VPN Router is rebooted. Because processes are still running, the copying of files can potentially cause file access problems.

To minimize the possibility of file access problems after the upgrade, Nortel recommends that you perform the following steps.

1 Disable new logins. See "Disabling new logins" on page 60 for the procedure.

2 Log off all active tunnel sessions.

a Select **Status > Sessions**.

b Scroll to the bottom of the window and click both **Log Off** buttons to log off all non-administrative users and all branch office connections.

Note: These sessions are logged off during the Apply process

3 Disable RADIUS accounting.

a Select **Servers > RADIUS ACCT** and disable all of the following options:

— **Internal RADIUS Accounting**

— **Interim RADIUS Accounting Record**

— **Response Timeout for RADIUS Accounting Server**

— **External RADIUS Accounting Server**

b Click **OK**.

Applying the software

After you start the apply process, do not make any queries on the VPN Router. Queries try to access files and can cause problems during the upgrade process.

To apply the new software:

1. Select **Admin > Upgrades**.
2. From the **Apply New Version** list, select the software version that you just downloaded.
3. Click **Apply** to start the upgrade process.

After you upgrade the software

After the VPN Router reboots itself with the upgraded software, follow these steps:

1. Wait 2 minutes after the reboot before you run queries to make sure that all startup processes had time to read the files they need.
2. If you are managing the VPN Router remotely, connect to the VPN Router over a user control tunnel.
3. Clear the cache on your browser and close all browser windows.
4. Restart your browser, log on to the VPN Router, and navigate to **Status > System**. Check the **Software Version** field to verify that the new software version is applied.
5. Select **Admin > Shutdown** and deselect **Disable new logins**.

Caution: If you do not follow the next step, the VPN Router shuts down.

6 Select a system shutdown type of **None** and click **OK**.

You have successfully upgraded your switch.

Chapter 4
Troubleshooting

This chapter introduces the concepts and practices of advanced network configuration and troubleshooting for the Nortel VPN Router. Its purpose is two-fold: to provide configuration details to consult when setting up or modifying the extranet, and to serve as a resource when diagnosing client and network problems.

Typically, there are three types of problems to address when managing an extranet:

- connectivity
- performance
- general

As a network administrator, your primary concern is to maintain connectivity. For extranet access, this means maintaining the secure connections between your remote users and the private intranet serviced by the VPN Router. Performance is another area of concern. Paying attention to performance helps you address issues before they become problems.

Connectivity problems occur when the remote user cannot establish a connection with areas of their private corporate network. There are several points of failure to consider when diagnosing connectivity problems. Problems can range from something as simple as a modem configuration error on the client workstation to a complex HDLC protocol error on the T1 WAN interface.

Troubleshooting remote access problems typically starts at the client end when the remote user cannot establish a connection, loses a connection, or has difficulty browsing the network or printing. When connectivity problems occur and the source of the problem is unknown, it is usually best to follow the OSI network architecture layers. Therefore, start diagnosing the physical environment, the modem, and the cables before moving up to the network and application layers (for example, pinging a host and Web browsing).

As with connectivity, there are many places in the extranet network where network performance is affected. By regularly checking the network statistics, logs, and health check information, and by informing users of good network practices, you can often avoid problems and enhance the productivity of the extranet.

General problems are categorized here as problems other than those related to connectivity or network performance. For the latest release-specific problems, check the release notes.

Troubleshooting tools

For the VPN Router administrator, a robust troubleshooting toolbox is filled with both standard and special tools for diagnosing network problems. Standard tools like Telnet, PING, Trace Route (tracert.exe), sniffers, and analyzers are a basic necessity. To this collection, some special tools are added to the VPN Router manager and remote client applications. These special tools include client- and VPN Router-based tools.

Client-based tools

IPsec VPN Client Monitor provides network statistics on device, connection, and network errors that help monitor traffic flow and assess IPsec connection performance. Statistic counters are updated once a second. For more information on the IPsec VPN Client Monitor, see the VPN Client online Help.

Microsoft Point-to-Point Tunneling Protocol (PPTP) Dial-Up Networking Monitor provides network statistics on device, connection, and network protocols that help monitor traffic flow and assess PPTP connection performance. For more information on the PPTP Dial-Up Networking Monitor, see the PPTP help or your Microsoft PPTP client documentation.

System-based tools

Use the Manager Status > Health Check window to view colored status indicators that evaluate individual component status, and click associated hyperlinks to go directly to manager windows for corrective action.

Use the Manager Status > Statistics window to view detailed system and network statistics.

Use the Manager Status > Security, Config, System, and Event Log window to view various logs recording system and network events that help you trace problems and determine their origins.

Other tools

Table 2 lists the tools that are helpful for diagnosing connectivity problems from Windows* 95, Windows 98, and Windows NT* workstations.

Table 2 Troubleshooting tools

Windows 95/Windows 98	Windows NT	Use for...
Winipcfg command	Ipconfig command	Obtaining IP address, DNS, WINS information
Netstat command	Netstats command	Viewing statistics from Microsoft TCP/IP stack
Ping and tracert commands	Ping and tracert commands	Testing connectivity, name resolution, route tracing
Dial-Up Monitor status	Dial-Up Monitor status	Viewing modem settings, throughput and errors

Solving connectivity problems

This section lists many of the common connectivity problems that occur and their recommended solutions. Problems, and some typical client user responses that can help with diagnosis, are categorized as follows:

Modem and dial-up problems

"I cannot browse the Web or check my e-mail over my dial-up connection."

"I cannot ping my ISP site."

Extranet connection problems

"I can browse the Web over my dial-up connection, but I cannot log in to my network over the extranet connection."

Problems with name resolution using DNS services

"I logged into my corporate network, but I get messages saying the host is unknown."

"I can ping the host using its IP address, but not using its host name."

Network browsing problems

"I cannot browse the corporate network."

"I cannot print."

"I cannot access the Internet over my extranet connection."

Diagnosing client connectivity problems

A connection can fail at varying points in an extranet. If remote users have a problem accessing their corporate network and the source of the problem is unknown, Nortel recommends that they follow these steps to first determine whether the problem is with their modem, Point-to-Point Protocol (PPP) dial-up, or with the extranet connection:

1. Confirm that the modem is attached and working properly by running a terminal emulation program at their remote workstation, such as, Hyperterminal*, and issuing the AT command. If the response is **AT OK**, the modem is operating correctly.
2. Verify that there is a **PPP** dial-up connection over the internet. To do this, before trying to establish an extranet access or PPTP connection, have them try Web browsing www.nortel.com or another Web site. If the remote user can access the Web site, their PPP dial-up connection is working properly. See the section "Common client connectivity problems" to further troubleshoot the connection problem. If the remote user still cannot verify that their dial-up connection is working properly, continue with step 3.
3. Ask the remote user to check that their modem type and settings are configured properly. To do this, they right-click on the **Dial-Up Networking** connection icon (the icon they click to dial their connection) on their desktop to view its properties. Verify that these settings are correct for their modem configuration.
4. If the remote user is connected but unable to access any resources or servers, have them go to the **Start** menu and check their system's connection information, select **Run**, and type **`winipcfg`** in the text box (or **`ipconfig`** if using Windows NT). Ask them to view the statistics for their PPP adapter and confirm that the entries match those provided by the Internet service provider (ISP).
5. If the remote user is still unable to view resources or servers over their PPP dial-up connection, contact their ISP to see if any connection attempts were logged from the user, and for additional troubleshooting assistance.

Common client connectivity problems

Extranet connection problems

If the client is successfully connecting to their ISP, but is having problems accessing their intranet over their PPTP or IPsec VPN Client connection, have them check the following areas to further troubleshoot their connection problem.

The following messages and their associated cause and action statements are directed to the IPsec VPN Client user at the remote workstation. This information is also available in the VPN Client online Help.

Remote host not responding

Cause: This indicates that the VPN Router never responded to the IPsec connection attempt or that User Datagram Protocol (UDP) port 500 is blocked.

Action: Verify that the VPN Router is accessible by pinging the host name or IP address that you filled in the destination field. To ping a host called extranet.corp.com, for example, open an MS-DOS command prompt and type **`ping extranet.corp.com`**. If you receive a reply message, it indicates that the VPN Router is accessible but is not responding. If you received a message that says Request Timed Out from the `ping` command, it means that the VPN Router is inaccessible. You can further diagnose the problem using the MS-DOS Trace Route command (`tracert.exe`) on Windows systems.

The VPN Router allows only a certain number of PING packets from another Internet host before requiring a tunnel connection to be established.

Maximum number of sessions reached

Cause: This indicates that the maximum number of users for the account you are using are currently logged in.

Action: If you are the only user with access to your account, it is possible to get this error if you restarted an IPsec connection immediately after losing the dial-up connection to your ISP. This is because the VPN Router takes up to one minute to determine that your connection is dropped and logs you off from your account. Simply wait a minute and retry your connection.

Login not allowed at this time

Cause: This indicates that your account is limited to specific hours of access and you are trying to connect outside of the allowed time.

Action: Contact your network administrator if you are unsure of your specific hours of access.

Authentication failed

Cause: The IPsec user name is incorrect or the password is invalid for the user name entered.

Action: Verify that the user name you entered is correct and retype the password before trying the connection again.

No proposal chosen

Cause: The VPN Router you are connecting to is not configured to handle the authentication method configured under the current connection profile.

Action: Verify that you are using the correct IPsec parameters, such as a choice of ESP-3DES with SHA1. Make sure it matches what the client (for example, an International client) can do.

Other IPsec errors

Cause: Typically other error messages indicate an error in configuration on the VPN Router that the network administrator must correct.

Action: Contact your Network Administrator with the specific error message.

Extranet connection lost

If the PPTP or IPsec VPN Client connection was initially established and then fails, one of two error messages appear: *The physical connection has been lost* or *The secure extranet connection has been lost*.

The physical connection has been lost

Cause: The PPP connection to your ISP was disconnected.

Action: Re-establish the PPP dial-up connection to your ISP before you re-establish the extranet connection to the remote network.

The secure extranet connection has been lost

Cause: For IPsec only, the VPN Router that you are connected to has either logged your connection off or is no longer responding.

Action: Click **Connect** to re-establish the extranet connection. If this works, the connection was probably lost due to the Idle Timeout configured on the VPN Router. If no data is transferred through the extranet connection for a long period of time, normally 15 minutes or more, the VPN Router automatically disconnects the connection.

If you were unable to successfully re-establish the extranet connection, the dial-up connection may be preventing data from traveling between the VPN Client and the VPN Router. Hang up the dial-up connection and reconnect before you try to re-establish a connection. If you are still unable to connect to the VPN Router, open an MS-DOS Command Prompt and try pinging the VPN Router using the host name or address that you specified in the Destination field. If you receive a Destination Unreachable error message, there is a routing problem at the ISP. If you receive a Request Timed Out error message, the VPN Router is probably not available, and you can contact your network administrator.

Auto disconnect closes the dial-up connection during data transfer activity

Cause: In Windows 95 only, The Microsoft Auto Disconnect feature does not recognize data activity unless it passes through Internet Explorer. Microsoft has documented this as a known problem in Windows 95.

Action: At the remote workstation, disable Auto Disconnect if you are not using Internet Explorer to access data on the remote network. To do this, open the Control Panel and choose the **Internet** icon. Select the Connection property sheet and deselect **Disconnect if idle for**.

Problems with name resolution using DNS services

DNS misconfiguration is usually the problem if a client can ping a host using an IP address but not with its host name, or receives messages that the host name cannot be resolved, .

Cause: You cannot configure a DNS server for PPTP or IPsec connections on the VPN Router.

Action: Validate that the VPN Client is configured with a DNS entry. For Windows NT 4.0, open a command prompt and enter **`ipconfig/all`**. Verify that a DNS server entry is listed. For Windows 95, from the Start menu on the task bar, select **Run** and enter **`winipcfg`**. Select Nortel VPN Router Extranet Access Adapter from the list of adapters and click **More Info**. Record the information displayed under the DNS Server entry and verify it with the network administrator.

Cause: The hostname being resolved has both a public and a private IP address, commonly referred to as a split-horizon DNS.

Action: Open a command prompt and ping the host you are trying to reach with a fully qualified host name (for example, www.nortel.com). If you receive a response, verify that the IP address returned on the first line (for example, www.nortel.com [207.87.31.127]) is an IP address from the remote corporate network. If it is not, notify your network administrator that you need to modify the internal hostname so that it is not the same as the external hostname.

Cause: The retail release of Windows 95 contained a bug that prevented use of more than one DNS server. This problem was fixed in OS Release 2.

Action: If you are using a release earlier than OS Release 2 of Windows 95, a patch is available from Microsoft to upgrade the winsock.dll. This patch is downloadable from www.microsoft.com.

Network browsing problems

Cannot browse the network (with NetBEUI)

Cause: For both PPTP and IPsec, the VPN Router does not currently support the NetBEUI protocol.

Action: To browse resources on a remote domain through a connection to a VPN Router, it is necessary to remove the NetBEUI protocol and to have a WINS server configured. By removing NetBEUI, the Microsoft Client uses NetBIOS over TCP/IP to browse network resources. This applies to both the PPTP dial-up client provided by Microsoft and the VPN Client provided by Nortel.

Cannot access Web servers on the Internet after establishing a VPN Client connection

Cause: For both PPTP and IPsec, this condition occurs as a result of all network traffic passing through the corporate network. Typically, firewalls and other security measures on the corporate network limit access to the Internet.

Action: The administrator can set up a default route on the VPN Router to forward traffic to the Internet. If this default route is not configured, you must disconnect the extranet connection to Web browse the Internet through your ISP connection.

Alternatively, if you are using a proxy-based firewall, you must set the Web browser to use the firewall to proxy for HTTP traffic when the tunnel connection is in use.

Cannot access network shares after establishing an extranet access connection

Cause: A Windows Internet Name Service (WINS) server is not configured for PPTP or IPsec connections on the VPN Router.

Action: Validate that the VPN Client is configured with a WINS server. Follow the steps outlined above under "Problems with name resolution using DNS services" to run `ipconfig` at a command prompt on Windows NT 4.0 or to run `winipcfg` on Windows 95. Verify that a primary WINS server is listed under the section for the adapter named IPsecShm on Windows NT 4.0, and on Windows 95 verify that a primary WINS server is listed in `winipcfg` for the VPN Client adapter. If there is no primary WINS server listed, notify the network administrator that the VPN Router may not be properly configured.

Cause: Your system is set up for a different domain other than the one on the remote network.

Action: Skip the initial domain login when Windows 95 starts and choose **Log on to the Remote Domain** under the Options menu of the VPN Client dialog box. You are then prompted to log in to the domain of the remote network after the extranet connection is made. This is the recommended method for users with docking station configurations.

Alternatively, on NT 4.0, Windows 98, and Windows 95, complete the following steps to change your workstation to be a member of a workgroup instead of a domain:

1. From the Start menu, select **Settings** > **Control Panel**. In the **Control Panel**, double-click **Network**.

   The Network Control Panel applet appears.

2. Select the **Identification** tab. In Windows 95, you can modify the entries on the Identification tab; on NT 4.0, you must click **Change** to change the entries.
3. Change to use a **Workgroup** and verify that the computer name does not match the entry on the remote network. The name for the workgroup is not important; you can enter anything.
4. Click **OK** to save the changes and reboot the machine.
5. When accessing a resource on the remote domain, if you are prompted for a user name and password, the domain name must precede the user ID. For example, if the user ID is JSmith and you are accessing a machine on the remote domain named CORP, enter your user name as CORP\JSmith.

Diagnosing WAN link problems

WAN link problems can occur between the VPN Router and the public data network (PDN) at three levels:

1. T1/V.35 interface
2. HDLC framing
3. PPP layer

If a connectivity problem occurs with the WAN link, there are two approaches to diagnosing and correcting the problem.

- Start from the bottom to verify that physical connectivity exists, then make sure that the HDLC link is up, and finally examine the PPP status to see if it is passing IP packets back and forth.

- Start from the top down to go in the opposite direction, looking at PPP first and working down to the physical connection. An important point to remember when taking this approach is that at the higher protocol layers, there are more options to misconfigure, but changing them is easier and generally involves less effort.

A key point to remember when diagnosing WAN link problems is to involve the T1 service provider in the troubleshooting effort. This is not only because they can help diagnose the problem, but also because an ISP can bring down a link if it detects errors on the line. Notify the ISP administrator if you are planning to work on the link.

Check the T1/V.35 interface

To diagnose a problem at the WAN physical layer, use the following steps to verify that the T1/V.35 interface to the public data network (PDN) is operating correctly, and that the T1 line is properly connected:

1. Have your ISP run a loopback test from their end to the CSU/DSU to verify that the external line is working correctly.
2. Check the connections between the VPN Router and the CSU/DSU. Make sure that the **V.35 cable** is a straight-through cable and firmly seated, that the **CSU/DSU** is configured to use internal clocking, and that **NRZ** is encoded with **CCITT CRC** for the checksum.
3. Make sure that all the **control signals** are asserted (CTS, DCD, DSR, RTS, and DTR). You can check these signals on the VPN Router from the Manager WAN Statistics window. If any of these signals are incorrect, you can try disabling or enabling the link from the Manager WAN Interfaces window, or unplugging and plugging in the link. If these steps do not resolve the problem, try switching ports on the same card, switching cables, or switching to a new card, if available.
4. If the previous steps fail to resolve the problem, and you still suspect a problem with the physical connection, try rebooting the VPN Router to reinitialize the WAN interface.

Check the HDLC framing

Assuming that the T1/V.35 interface is operating correctly, use the following steps to determine whether the HDLC layer is up and running properly, and to provide information for Nortel Customer Support for further diagnosis:

1. Check that there are no input or output errors reported on the **Manager WAN statistics** window. Also look to see if the input and output counters are incrementing at all. If the input/output counters are not incrementing, or are incrementing by huge amounts, then there are probably framing or timing errors on the link. Also, a large percentage of input errors can indicate a problem with the FCS (Frame Check Sequence) calculation.
2. Examine the **Manager Statistics event log** with debugging enabled. Any WAN-related log messages probably indicate some sort of error.
3. Report any of the preceding errors and messages to Nortel Customer Support for assistance in diagnosing the HDLC framing problem.

Check the PPP layer

If the WAN link is passing frames back and forth, but IP packets are not flowing, then the problem can be how PPP is configured.

To examine the state of the PPP connection, and to provide information for Nortel Customer Support for further diagnosis:

1. Check whether the state of the PPP connection is changing at all by periodically clicking **Refresh** while viewing the WAN statistics window. If the state is always Down, PPP may not know that the link is up. If the state toggles between Dead and LCP Negotiating, PPP is trying to come up but cannot. This is probably due to a problem with the underlying layers, although it can also be a bad configuration of the LCP options.
2. If the connection fails during authentication, then try disabling the **PPP Authentication** settings. A problem during Network Negotiating is usually due to misconfigured IPCP options.
3. Verify that all the authentication settings match the ISP-recommended router configuration.

4 If the PPP layer still does not come up, enable the interface debugger to generate large amounts of packet traces in the event log. Report this information to Nortel Customer Support for further diagnosis.

Hardware encryption accelerator connectivity

If the hardware encryption accelerator fails, all sessions are automatically moved over so that the software can handle them.

Solving performance problems

This section describes ways to improve the performance of the remote workstation connection to the corporate network through a VPN Router. It also includes Microsoft networking and client setup and operation tips.

Eliminating modem errors

Modem hardware errors can impact performance when connecting to your corporate network over a dial-up connection. If modem hardware errors are occurring, try the following techniques to correct these errors and improve performance:

- Adjust the modem speed—If the speed of the modem is set too high, it can cause hardware overruns. Reset the modem speed to match the real speed of the modem.
- Disable hardware compression—The data passed through the extranet connection is encrypted, and encrypted data is typically not compressible. Depending on the algorithm the modem uses to compress the encrypted (non-compressible) data, the data can expand in size and overrun the modem's buffers.

Performance tips for configuring Microsoft networking

For Microsoft networking to work as designed over the extranet, each of the following components, if configured, must work together:

- DHCP Server assigns IP addresses to clients
- WINS Server provides a translation of the NetBIOS domain name to the IP address
- DNS Server provides a translation of the IP Host name to the IP address
- Master Browser is an elected host that maintains lists of all NetBIOS resources
- Domain Controller maintains a list of all clients in the NetBIOS domain and manages administrative requests such as logins
- VPN Router terminates tunnels and routes Microsoft networking requests

The following questions and answers are particularly directed toward the WINS server and browsing issues. These questions and answers can help verify whether you correctly set up these components.

What needs to be configured on the VPN Router for network browsing?

In the group profiles, set the values of the DNS server and the WINS server. Remember that these are inherited values, so that if all subgroups of a given group use the same servers, it is sufficient to configure them in the parent group.

If these servers are not on a directly reachable subnet from the VPN Router, or accessible through a default VPN Router, you must configure a static route on the VPN Router to reach them.

What should be configured on the PPTP or IPsec client?

The client needs the protocols for NetBIOS and TCP/IP configured. NetBEUI is not normally configured.

Configure a Windows 95 or Windows 98 client so that it is in the correct workgroup for the NT domains it is trying to reach. For example, if there are domains named Engineering and Admin, and the client is to use the Engineering domain, then you must configure it that way.

For PPTP only, you must also select **Log onto Network** under My Computer > Dial Up Networking > Connection_Name.

The client system's NetBIOS name must be unique in the private network to which the client is connecting. Do not use the same name as your office desktop machine or something like *my computer*. Uniqueness is required.

What is the preferred way to access neighbors on the network?

Microsoft recommends against browsing the Network Neighborhood when tunneling. Another way to access a network resource is through the `run` command. For example, to access shared folders on the machine HotDog, choose Start > Run and type in \\HotDog. If you experience delays using Network Neighborhood, try this method instead.

Why should WINS settings be different for extranet access?

WINS servers cache a correspondence between IP addresses and NetBIOS names. These cached values are only invalidated by a timer, not by network activity. Therefore, if a WINS server is used heavily by clients, set its expiration timeouts low.

In a static environment, where names and addresses correspond forever, this is not an issue. But in the extranet environment, clients are assigned new IP addresses whenever they form a tunnel. Therefore, the correspondence is transitory.

Microsoft default values for the timeouts are enormous (for example, 3 weeks). These must be reduced for an extranet environment.

What WINS settings are recommended?

The WINS settings are available on the WINS server through the Start menu > Programs > Administrator Tools. The following values for a WINS server are:

- Server Configuration
- Renewal Interval: 41 minutes
- Extinction Interval: 41 minutes
- Extinction Timeout: 24 hours
- Verify Interval: 576 hours

The renewal interval governs how often a client must reregister its name with the WINS server. It begins trying at one-half of the renewal interval. The extinction interval governs the length of time between when a client name is released and when it becomes extinct. These intervals are the most important to control when using dynamic addresses.

There is a trade-off in setting these intervals. If they are set too small, there is too much additional client registration network activity. If they are set too large, transient client entries do not time out soon enough. If you also have secondary WINS servers, make the renewal interval the same on the secondary servers as on the primary server.

For additional information on setting interval values for a WINS configuration, see the Microsoft Knowledge Base article *Min. and Max. Interval Values for WINS Configuration* available at www://support.microsoft.com/support. A WINS server that has a heavy CPU load or network load does not perform well. To help performance:

- Do not run other intensive tasks on the WINS server.
- In the WINS configuration, disable detailed logging.
- If you have primary and secondary WINS servers, assign them a balanced load.

For hosts that never change IP addresses, you can give static entries in the WINS database. For example, you can configure the address of the Primary Domain Controller as static. To do this, you also need a statically reserved DHCP address for the primary domain controller.

What can you try on the WINS server when it is not working?

You can request that the WINS server clean up its database by going into the Mappings menu and selecting **Initiate Scavenging**.

If the database becomes very large, you can compact it by using the jetpack.exe program in \winnt\system32. Consult the WINS Help before doing this because the server must be shut down.

In the WINS mappings entry, enter a **`show database`** command. Note the entry for -__MSBROWSE__. This is the machine that is actually the elected master browser, and it changes frequently. If this entry is pointing to an invalid machine, it can cause problems.

Can I control which machine is the master browser?

When you start a computer running Windows NT Workstation or Windows NT Server, the browser service looks in the registry for the configuration parameter MaintainServerList to determine whether a computer becomes a browser. This parameter is under:

```
\HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\Browser\
Parameters
```

For Windows 95, this parameter is under:

```
HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\VNETSUP\
MaintainServerList
```

MaintainServerList parameter values are:

- No—this computer can never participate as a browser.
- Yes—this computer can become a browser.
- Auto—this computer, referred to as a potential browser, can or cannot become a browser, depending on the number of currently active browsers.

The registry parameter IsDomainMasterBrowser impacts which servers become master browsers and backup browsers. The registry path for this parameter is:

```
\HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\Browser\
Parameters.
```

Setting the IsDomainMasterBrowser parameter entry to True or Yes makes the computer a preferred master browser.

When the browser service is started on the preferred master browser computer, the browser service forces an election. Preferred master browsers are given priority in elections, which means that if no other condition prevents it, the preferred master browser always wins the election. This gives an administrator the ability to configure a specific computer as the master browser.

To specify a computer as the preferred master browser, set the parameter for IsDomainMasterBrowser to True or Yes in the following registry path:

```
\HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\Browser\
Parameters
```

Unless the computer is configured as the preferred master browser, the parameter entry is always False or No. There is no user interface for making these changes; you must modify the registry.

Why are subnet masks important?

If a client does not have a WINS server or is unable to contact it, it must broadcast a query to try to locate a host. Unfortunately, Windows 95, Windows 98, and Windows NT clients do not always use the correct broadcast address when tunneling.

The following example helps explain this problem. Suppose that you are using a private net 10 address space. Assume further that you have a client with IP address 10.1.2.3 and subnet mask 255.255.0.0. This means that the net 10 space is used like a class B address space, which is perfectly legal. The correct broadcast for this client is 10.1.255.255. However, Microsoft clients can broadcast to 10.255.255.255, using the natural class A for net 10, in spite of their configuration.

If all hosts that the client is trying to reach lie on the same physical segment, this probably will work. This is because every host on the physical network receives the all subnets broadcast and probably responds, if appropriate.

All hosts on the segment receive the broadcast to 10.255.255.255, even if they are on different subnets (10.1.x.x. and 10.2.x.x). However, in a routed environment the situation changes. In this case, a broadcast from 10.1.2.3 to 10.255.255.255 is not forwarded to the other 10.2 subnet.

In the extranet environment, make the remote client appear as much as possible to be on the local LAN. If the extranet host is assigned address 10.1.2.3, it should behave as if it is on the 10.1 LAN.

When 10.1.2.3 broadcasts to find a network neighbor, it (incorrectly) sends to 10.255.255.255. Normal routing functionality does not forward such a packet. The VPN Router finds the best match among its physical interfaces (10.1 in this case) and modifies the broadcast to be correct for that interface (10.1.255.255 here).

In this example, if the VPN Router's 10.1 interface was configured with any subnet mask other than 255.255.0.0, the broadcast would not have been converted as desired.

What should I do about subnets?

Configure every private interface on the VPN Router to have the same subnet mask as all of the clients residing on that subnet.

Why is there a delay in discovering the Network Neighborhood (with tunnels)?

NetBIOS treats the modem interface as if it is two different interfaces: the original modem and the tunnel. It designates the original modem as the primary interface. (You can observe this by typing `route print` in a DOS command shell.) If you tunnel over a LAN instead of a modem, the LAN adapter is designated as the primary interface.

When first instructed to seek the Network Neighborhood, NetBIOS always tries the primary interface first. This is always the wrong choice because NetBIOS tries to send using the IP address assigned by the ISP (or possibly the address of another adapter) instead of the address assigned to the tunnel by the VPN Router.

The outcome is somewhat different for IPsec and PPTP. For IPsec, the client recognizes this incorrect behavior and refuses to even send the packets. You can see a counter of the number of invalid packets of this type on the client under the status Invalid IP address.

With PPTP, the client does send the packets, but they are rejected at the VPN Router as invalid tunneled packets because the source address does not match the VPN Router-assigned address. If you inspect the event log, there are messages of the form Bad source address in tunnel and the session/details counter for source address drops increases.

After about 10 to 15 seconds, NetBIOS gives up on the primary interface, moves to the correct tunnel interface, and starts to browse the Network Neighborhood.

Why can't I browse another client in a different tunnel?

Cause: If you are not using a WINS server, this is not possible because network browsing requires broadcasts from one tunnel to another.

Action: Use a WINS server to browse another client in a different tunnel. When the clients tunnel in, they should register with the WINS server. Be sure that the client you want to browse has **Log onto Network** enabled under My Computer > Dial Up Networking > Connection_Name.

Where can I get more information on troubleshooting dial-up connections?

The Microsoft Knowledge Base article *Dial-Up Networking 1.2 Dun12.doc* file, available from www.support.microsoft.com/support, contains help for resolving common dial-up problems.

Depending on the service provider, a point of presence (POP) may not support LCP options. If your connection constantly gets declined after the modems synchronize, and you know your password is correct, try disabling this option. The Microsoft Knowledge Base article *Service Pack 2 May Cause Loss of Connectivity in Remote Access* contains more details.

Where can I get more information on configuring PPTP on my client?

There are many articles in the Microsoft Knowledge Base on configuring PPTP for Windows NT, Windows 98, and Windows 95. See the section "Additional information"" for a partial list. In addition, Microsoft has the following white papers available at www.support.microsoft.com/support that contain helpful information:

- Microsoft Windows 95/Windows NT White Paper, *Installing, Configuring, and Using PPTP with Microsoft Clients and Servers*
- Microsoft Windows NT Server White Paper, *Understanding PPTP*

You must create a connection definition for your initial Internet link through your service provider. A separate connection definition is needed for creating the PPTP tunnel. A common configuration problem experienced during initial PPTP setup is the failure to select the PPTP VPN adapter (instead of the modem) on the PPTP connection definition in Dialup Networking.

What DNS and WINS servers do I set for the dial-up connection?

There is no need to set these servers statically on your dial-up client because information is dynamically downloaded from the VPN Router for PPTP, IPsec, and Layer 2 Forwarding (L2F) tunnels at connect time.

Why does DNS resolve hosts to different addresses when a tunnel connection is active?

Cause: When a tunnel connection is activated, additional DNS servers are downloaded from the extranet device to your client. In the case of Microsoft Windows 95, Windows 98, and Windows NT operating systems, the new DNS servers are added to the list of DNS servers that were assigned by your ISP. This applies to PPTP as well as IPsec tunnels. In general, the DNS servers downloaded by the extranet device provide host-name-to-address translation for hosts within a private network while the ISP-based DNS servers translate public host names.

For Windows 95/98 and Windows NT, when a host name must be translated to an IP address (for example to browse the Web or get e-mail), all DNS servers are queried in a shotgun style. The first server to respond with an IP address wins. This can produce some interesting behavior if a host name resolves to one address on the private network and another on the public Internet. For example, host mail.mycompany.com could internally resolve to 10.0.0.282 and externally to 146.113.64.231.

Action: To avoid problems when using a mixture of internal and external DNS services, it is essential to avoid using names that resolve to different addresses. In the preceding example, rename the host 10.0.0.282 to pop.mycompany.com. Then users are informed to use the hostname pop.mycompany.com to retrieve electronic mail, whether in the office or connected through a tunnel link.The original retail release of Windows 95 requires the Winsock DNS Update (wsockupd) to properly function with multiple DNS servers.

My downloaded DNS servers for my tunnel connection do not work

Cause: The Microsoft Windows 95/98 and Windows NT operating systems attempt to ping new DNS servers before adding them to the current list of servers.

Action: As a quick test, try to ping (with the tunnel connection active) the DNS servers that the extranet device is downloading at tunnel startup. If you cannot ping the servers, a basic connectivity problem using the tunnel connection exists.

To view the current list of DNS servers at any time use the MS-DOS command `ipconfig/all` on Windows NT or `winipcfg` on Windows 95 or Windows 98.

Why, after disconnecting a PPTP tunnel, do I get an immediate error reconnecting?

Cause: After you disconnect a PPTP tunnel, then immediately try to reconnect, the PPTP client indicates that the connection is busy or otherwise unavailable. On Windows 95 this is caused by the PPTP control channel socket being improperly shut down by the client.

Action: You can wait for the socket to time out, but it is often more expedient to reboot. On Windows NT a similar problem is encountered, but caused by a TCP checksum error generated by the Microsoft IP stack. The only current resolution for the Windows NT error condition is to reboot.

Additional information

Below is a list of some of the Microsoft Knowledge Base topics you can browse for information related to dial-up and tunnel configuration. To view these topics, go to www.support.microsoft.com/support. Use the Search Support Online feature to search on the title you want:

- Troubleshooting Internet Service Provider Login Problems
- Service Pack 2 May Cause Loss of Connectivity in Remote Access
- Troubleshooting Modem Problems Under Windows NT 4.0
- Dial-Up Networking 1.2 Dun12.doc File (Windows 95 PPTP Troubleshooting)

- How to Troubleshoot TCP/IP Connectivity with Windows NT
- Remote Access Service (RAS) Error Code List for Windows NT 4.0
- RAS Error 720 When Dialing Out
- Troubleshooting PPTP Connectivity Issues in Windows NT 4.0
- PPTP Registry Entries
- Connecting to Network Resources from Multihomed Computer
- How to Force 128-bit Data Encryption for RAS
- Login Validation Fails Using Domain Name Server

Solving general problems

This section contains general recommendations and explains some common problems that can occur with common Web browsers, the Nortel VPN Router Web Manager, and the VPN Router.

Web browser problems and the VPN Client Manager

If you have a problem browsing the Nortel VPN Client Manager, start by checking the following recommendations to ensure that you are using the correct Web browser version and settings. For additional troubleshooting, check the described Web browser problems and solutions, error messages, and tips described later in this section.

Nortel VPN Client Manager uses Java* and HTML features. For the management interface to function properly, verify that your Web browser meets the following minimum requirements:

- Platforms supported include Windows 95, Windows 98, Windows NT, or Macintosh*.
- Display setting of 256 colors or greater.
- Browser versions supported include Microsoft Internet Explorer, Version 4.0 or later and Netscape Communicator*,Version 4.0 or later. Not using a recent version of Internet Explorer causes the upper-left corners of the management windows to remain gray rather than displaying the navigational menu and the current menu selection, respectively.

- For ActiveX Scripts, Java, and JavaScript*, you must enable both ActiveX and Java programs in Internet Explorer, and enable both Java and JavaScript in Netscape Communicator for proper VPN Router Web management windows. These options are enabled by default on both Web browsers.

Enabling Web browser options

To make sure these options are enabled in Internet Explorer, from the Internet Explorer menu bar, select **View** > **Options** > **Security**, and select:

- Run ActiveX scripts—If this option is disabled, navigational titles are not updated, and the Logoff and Help buttons do not work.
- Enable Java programs—If this option is disabled, navigational menus do not appear.

To make sure these options are enabled in Netscape*, from the Netscape menu, select **Edit** > **Preferences** > **Advanced**, and select:

- Enable Java – If this option is disabled, navigational menus do not appear.
- Enable JavaScript – If this option is disabled, navigational titles are not updated, and the Logoff and Help buttons do not work.

Long delays when Web browsing

Cause: HTTP—Sometimes when you HTTP the Web interface, you can experience long delays (greater than five minutes).

Action: Wait until the requested window is fully delivered before clicking on a new window request.

Improving performance with Internet Explorer 4.0

Nortel recommends that you create a DNS server entry for your management IP address. This alleviates a noticeable delay in loading the initial Main menu and navigational windows.

Clearing your Web browser cache when upgrading

To avoid problems when upgrading software revision levels, Nortel recommends that you clear your browser cache and exit the browser and all associated windows (such as mail and news readers). See the following section for browser cache clearing instructions.

Clearing cache

A browser caches windows to improve performance when the same window is requested again. The VPN Router's HTTP server allows browsers to cache Java class files and all image files, but does not allow browsers to cache body windows that contain the dynamically generated information. Both Internet Explorer and Netscape allow you to clear the browser cache which causes all windows to be rerequested the next time they are required. To manually clear the browser cache in Internet Explorer V4.x, select **View > Internet Options**, and click **Delete Files**. To manually clear the browser cache in Netscape V4.x, select **Edit > Preferences > Advanced > Cache** and click **Clear disk and memory cache**.

Web browser error messages

No data in post message

Cause: This message often appears on the main body window if you use the browser's back arrow to revisit a previously displayed window. The browser displays this message when it knows you are revisiting a dynamically generated window.

Action: To see the window, use the left navigational area to select it.

Internal error message

Cause: The HTTP server was unable to allocate memory. This indicates that the VPN Router is very low on memory.

Action: Terminate any unnecessary tasks to free up memory. It may be necessary to reboot the VPN Router. If this condition recurs, there can be a serious problem. Contact Nortel Customer Support.

Document not found message

Cause: This message is returned when the HTTP server cannot find the requested window. This can happen because the Java navigation index file is out of synch with the rest of the system. A corrupted or incorrectly cached index file can also cause this problem.

Action: Clear your browser cache or restart your browser to correct this problem.

New administrator login ignored

Cause: Internet Explorer saves your user ID and password in its cache and automatically resends those values on subsequent login attempts. Therefore, when prompted after an idle timeout, the user ID and password value you enter are ignored, and Internet Explorer sends the original user ID and password. For example, if you log in as administrator with password abc123De, log out, and then log in again, this time as DottieDoe with password FGh45678, Internet Explorer sends Administrator with passwordabc123De.

Action: When you log off the VPN Router, close out of the Web browser completely (shut down the browser). This clears the cache and the next time that you log in you are starting fresh.

Excess resource consumption using Internet Explorer

Cause: Internet Explorer has a known problem with excessive memory consumption using Java applets. Over time, this problem can cause serious overall system performance degradation.

Action: If you notice that your system's performance seems to slow down for no reason, close and restart Internet Explorer. This releases unused memory and improves system performance. Go to www.premium.microsoft.com/support/kb/articles/q173/1/45.asp for details.

Internet Explorer 4.0 multiple help windows

Cause: In Internet Explorer 4.0, if you select context-sensitive help and do not close the help window after viewing, you can end up with multiple help windows open.

Action: Close help windows after viewing them.

Distorted background images

Cause: In Netscape versions prior to 4.0, where you configured your Windows 95, Windows 98, or Windows NT system for 8-bit color (256 colors or less), images can appear distorted in the navigational area.

Action: To avoid this situation, increase the color display setting to 256 or greater. Check with your video card manufacturer's documentation to confirm that your video card supports 256 colors or greater.

Reporting a problem with a Web browser

When reporting a problem with a browser to Nortel, include the following information:

- workstation operating system and version
- browser vendor and version (major and minor version)
- cache setting (size in Netscape, percent of drive for Internet Explorer)
- Vvrify document setting (every time or once per session)

System problems

Excessive active sessions logged

Cause: The number of active sessions can reach more than 4 billion. This is an erroneous number that results from a negative number of sessions.

Action: Restart the system.

Power failure

Cause: The power supplies can become unseated during shipping. When this problem occurs, the VPN Router may not start, or a warning can be posted to the Status > Health Check window indicating a potential problem.

Action: If necessary, remove the front bezel as described in the installation guide, then push the bottom of the power supply in to reseat it.

Cannot convert from an internal address pool to an external DHCP server

Cause: You cannot convert IP address distribution from an internal address pool to an external DHCP server while sessions are active.

Action: Select **Admin** > **Shutdown**, and select **Disable Logins after Restart**. After everyone has logged off, you can convert from an internal address pool to an external DHCP server.

Group and user profile settings not saved

Cause: When you use the Save Current Configurations option on the Admin > Configs window, it saves only the operational parameters in the configuration file, such as interface IP addresses and subnet masks, backup host IP addresses, DNS names.

Action: To completely back up the VPN Router configuration, you must also back up the LDAP database, which contains the group and user profiles, filters, and backup file names. To do this:

1. Select **Servers** > **LDAP**
2. Click **Stop Server**.
3. Enter a file name in **Backup/Restore LDAP Database**. Make sure this name conforms to the MS-DOS naming conventions and append the filename with LDF (for example, ldapone.ldf). The restore process can take anywhere from five minutes for a very small LDAP database to several hours for a very large database.
4. You can view the progress of the restoration from the Admin > Health Check window.

Restart fails after using recovery and reformatting the hard disk

Cause: When you are using the recovery disk and reformatting the hard disk, sometimes the system does not restart.

Action: Power-cycle the system using the green power button on the back of the VPN Router.

Solving routing problems

The following sections describe routing problems.

Client address redistribution problems

The number of current Utunnel host users can display more than the configured maximum.

Cause: This is not an error and is the running state of the system. For example, if you configured a maximum of 200 and have 150 logins, the window displays the maximum as 200 and the current as 150. If you then modify the maximum to 100, the window displays the maximum as 100 and the current as 150. As users log out, the current number is eventually no greater than the maximum.

Action: No action.

Client address redistribution is enabled and the client is logged in, but the client is not communicating with the private network.

Cause: Client address redistribution is not enabled.

Action: Have the client log in again. Client address redistribution only takes effect if the client logs in when it is enabled.

1. Check the **Routing** > **Policy** window and make sure **Utunnel routes** is enabled.
2. Check that **OSPF** and **Routing Information Protocol** (RIP) are properly set up.
3. Check that you have the correct address ranges if you configured summarization.
4. Check that you have an **Advanced Routing license** if you are using OSPF for client address redistribution.

Solving firewall problems

An error occurred while parsing the policy

Description: The policy that you are attempting to view or edit cannot be opened because it does not conform to the required format. This is caused by an error in the LDAP database or a problem with the connection to the VPN Router.

Action:

1. Close the **Stateful Firewall Manager**.
2. Close all instances of the browser used to load the Stateful Firewall Manager.
3. Check that the connection to the VPN Router is established.
4. Check that the **LDAP server** containing the policy is properly configured and is active.
5. Restart the browser and navigate to the **System** > **Firewall** window.
6. Reload the **Stateful Firewall Manager**.

An error occurred while communicating with the VPN Router

Description: The Stateful Firewall Manager encountered an error while retrieving the data from the VPN Router. This can be caused by a network error or the VPN Router has stopped responding.

Action:

1. Close the **Stateful Firewall Manager**.
2. Close all instances of the browser used to load the Stateful Firewall Manager.
3. Check that the connection to the VPN Router is established.
4. Restart the browser and navigate to the **System** > **Firewall** window.
5. Reload the **Stateful Firewall Manager**.

Authorization failed. Please try again.

Description: This error occurs when the wrong authentication credentials are entered. The user is re-prompted for credentials until they are either correct or the user clicks Cancel.

Action: No action required.

Unable to communicate with the VPN Router

Description: The Stateful Firewall Manager cannot establish a connection to the VPN Router. This is caused by a network error, or the VPN Router is not responding to requests.

Action:

1. Close the **Stateful Firewall Manager**.
2. Close all instances of the browser used to load the Stateful Firewall Manager.
3. Check that the connection to the VPN Router is established.
4. Restart the browser and navigate to the **System** > **Firewall** window.
5. Reload the **Stateful Firewall Manager**.

The contents of the database may have changed

Description: This error occurred because the LDAP database has changed in such a way that the current data in the Stateful Firewall Manager may not be valid. This error is encountered when the following events occur:

- Internal LDAP server was shut down and restarted.
- External LDAP server in use is switched to the internal LDAP server.
- Internal LDAP server in use is switched to an external LDAP server.
- External LDAP server's port or IP address changes.

Action:

To ensure that the most current data is loaded:

1. Close the current policy, if opened. Saving is not permitted until this error is remedied.
2. From the policy selection window, select **All** from the **Refresh** menu.

System files were not loaded properly

Description: This error occurred because the files necessary to load the Stateful Firewall Manager were either not downloaded from the VPN Router properly or were not initialized properly.

Action:

If this error is encountered:

1. Close the **Stateful Firewall Manager**.
2. Close all instances of the browser used to load the Stateful Firewall Manager.
3. Restart the browser and navigate to the **System** > **Firewall** window.
4. Reload the **Stateful Firewall Manager**.

If the error continues to occur or if the Stateful Firewall Manager is accessed through a user tunnel:

1. Open the **Java Plug-in** Properties.
2. On Windows systems, select **Start** > **Settings** > **Control Panel** > **Java Plug-in**. For all other systems, see the Java Plug-in documentation.
3. Deselect **Cache JARs in Memory**.
4. Click **Apply** and close the Java Plug-in Properties window.
5. Close the **Stateful Firewall Manager**.
6. Close all instances of the browser used to load the Stateful Firewall Manager.
7. Restart the browser and navigate to the **System** > **Firewall** window.
8. Reload the **Stateful Firewall Manager**.

Chapter 5
Packet capture

Packet capture (PCAP) is a troubleshooting tool that network administrators and customer support personnel use, in conjunction with other tools such as statistics, logging, network analyzers, and testers, to remotely troubleshoot VPN Router and network problems. Packet capture is especially useful for troubleshooting the VPN Router 1010/1050/1100, which is typically located in a small office where no technical expertise is available. You can only configure PCAP with the command line interface (CLI).

There are two options when capturing packets:

- No packet loss—captures all packets. If the RAM buffer is full, a forced flush to disk occurs.
- Packet loss—skips some packets. If the RAM buffer is full, the VPN Router drops packets and inserts a malformed packet in the place where the packets were not captured. The malformed packet stores the number of dropped packets.

Note: While capturing packets with packet loss does not affect forwarding performance, capturing packets with no packet loss can affect performance.

When capturing packets traversing the VPN Router, you can do one of the following:

- write them to files in a circular buffer of maximum 999 files
- write them to stop when the specified maximum number of files is reached

PCAP initially occurs to the RAM buffer. A low priority task writes the RAM buffer to disk files, called the disk capture files. Although you can set the maximum size of this file, when the maximum file size is reached, PCAP can continue writing the captured data. You specify the directory where to save the files, and you use the automatic backup option (specific backup) to copy or move the files to another machine. If you use the automatic backup option, you must specify the path that specific backup uses to save PCAP files. If you want to back up a file every time the file changes, select auto trigger for the specific backup. For more information about automatic backup, see "Automatic backups" on page 52.

If you set the size of a disk capture file to a value other than 0, PCAP automatically saves the capture in a file and creates a new file with a name as follows:

<*prefix*>YYMMDD.<*extNr*>

where:

<*prefix*> is a two-digit prefix derived from the capture name that identifies the capture.

YYMMDD is the year, month, and day

<*XXX*> is a monotonically incrementing number that is the file extension.

The default value for the buffer size is:

- minimum 5 packets when capturing packets on disk, with no packet loss
- minimum 20 packets when capturing packets on disk, with packet loss
- 1 megabyte (Mbyte) for capturing packets in RAM

PCAP features

Packet capture enables the VPN Router to perform the following tasks:

- simultaneously capture network traffic at different sources (physical interfaces, tunnels, and the VPN Router as a whole)
- capture inbound or outbound traffic, or both

- limit the traffic that the filters capture
- automatically start and stop packet capture with triggers

Note: The VPN Router does not provide tools for opening and viewing captured data. You must offload the PCAP files to view them.

Security features

Packet capture on the VPN Router provides the following features to enhance security:

- Packet capture is disabled by default. You can enable packet capture using the CLI through the serial port only.
- To enable packet capture, you must configure a separate capture password.
- When you save a capture buffer to a file on disk, the file is encrypted. You must enter the capture password to decrypt PCAP files.
- To open a capture file, you use a tool called *openpcap* that is shipped with VPN Router software. The tool is built for both 128-bit and 56-bit versions and uses the same cryptographic library that the server code uses. The *openpcap* tool prompts you for a password.
- Packet capture configuration is not saved in LDAP or in the configuration file. When you reboot the VPN Router, the packet capture configuration is lost.

File format

Packets are stored in PCAP/TCPDUMP file format. Many tools recognize this file format. Packets are saved with the following additional information:

- timestamp of the packet
- length of the portion of the packet present in the PCAP file
- length of the entire packet as it was received or sent on the wire

Capture types

The VPN Router captures packets from the following sources:

- Physical interfaces, including the following:
  - — Asynchronous digital subscriber line (ADSL)/asynchronous transfer mode (ATM)
  - — Fast Ethernet and Gigabit Ethernet, including traffic that is not directed to the VPN Router (promiscuous mode)
  - — Dial (V.90 and asynchronous Point-to-Point Protocol [PPP])
  - — Integrated services digital network basic-rate interface (ISDN BRI)
  - — Serial
- Tunnels
  - — Branch offices (all types)
  - — User tunnels
- All IP traffic on the VPN Router

The following sections describe each type of capture.

Physical interface captures

Packet capture of traffic on a physical interface can help you troubleshoot Layer 2 issues, connectivity issues, and performance issues. The Layer 2 header is saved in the PCAP file for each packet. You can convert PCAP files containing traffic captured on a physical interface to most file formats, including Network General Sniffer.

Tunnel captures

You can use packet capture of traffic over tunnels to help troubleshoot a specific tunnel problem. For example, you can create a tunnel capture object to diagnose the following types of problems:

- a protocol not working for a particular user
- performance issues for a particular user
- Open Shortest Path First (OSPF) not working properly inside a specific branch office tunnel

Tunnel captures saved to disk are encapsulated with raw IP encapsulation. When you convert these files to file formats that do not support raw IP encapsulation (including Sniffer), L2 encapsulation is required.

You can configure a capture object for an existing tunnel or for tunnels that are not initiated. You can also enable *persistent mode* for tunnel capture objects. When persistent mode is enabled and a captured tunnel disconnects, packet capture restarts automatically when another tunnel session that matches the capture criteria begins. Tunnel capture criteria include the following:

- Tunnel type: user tunnel, branch office, ABOT initiator, or ABOT responder
- Tunnel protocol: IP security (IPsec), Layer 2 Tunneling Protocol (L2TP), Point-to-Point Tunneling Protocol (PPTP), or Layer 2 Forwarding (L2F)
- IP address of the remote peer on the tunnel session
- User ID (or another criterion to specify the user)

If you start a tunnel capture object and more than one tunnel matches the capture criteria, only the first tunnel is captured. If no tunnel matches the criteria, packet capture waits for a tunnel that matches the criteria. If you configure more than one capture object with the same criteria, the first matching tunnel uses the first PCAP object, and the next matching tunnel uses the other capture object. This way you can capture a set of tunnels with the same criteria in different capture files.

For performance reasons, only one capture object runs at a time for a specific tunnel. Multiple tunnel capture objects can run at the same time, but each object must capture a different tunnel.

Global IP captures

Global (raw) IP packet capture captures all IP traffic traversing any physical interface or tunnel on the VPN Router. Only one global IP capture object can run at one time. Packets are captured as they are encapsulated or decapsulated (depending on the capture direction that you configure). To restrict the amount of traffic that a global IP can capture, see "Filters and triggers" on page 108.

A global IP capture object captures packets beginning from the IP header; no Layer 2 header is saved in the capture file. Because both encrypted and decrypted packets are captured, global IP packet capture is useful in troubleshooting certain VPN issues.

Note: If capture objects for physical interfaces or tunnels are running at the same time as a global IP capture object, performance on the VPN Router is affected.

Filters and triggers

You can apply existing interface filters to a capture object as a capture filter or as a start or stop trigger. You configure capture filters, start triggers, and stop triggers independently.

Note: You cannot configure filters and triggers on ADSL/ATM interfaces.

Capture filters

To troubleshoot a specific type of problem and to limit the amount of data stored in the capture buffer, you can configure a predefined interface filter so that non-IP frames do not match any filter. For example, if you configure a capture object with a filter for a serial interface configured with PPP, no Link Control Protocol (LCP) traffic matches filter criteria on a capture object. You can configure the capture object to always capture non-IP frames or to always discard them.

To apply a filter to a capture object, you must first stop the capture object if it is running.

Triggers

By default, the system saves frames to the capture buffer as soon as a capture object starts. You can configure predefined or user-defined interface filters as triggers for capture objects. A trigger causes a capture object to start or stop automatically when they receive certain packets.

- A *start trigger* causes the system to wait for a specific packet before it starts saving packets to the capture buffer.
- A *stop trigger* causes the system to stop saving traffic in the capture buffer after a specific packet matching the stop trigger is encountered. The packet capture object, however, is not fully stopped. Start trigger can still restart the capture.

A trigger works only for the direction for which the capture is configured. For example, if you enable packet capture for outgoing traffic only, and the type of packet that triggers the capture to start or stop arrives only in incoming packets, the trigger does not work.

You can use triggers with filters. Like filters, triggers never match non-IP frames. The packets that triggered the capture object to start or stop are also captured if they match capture filters.

You can use a start trigger with a stop trigger to capture specific transaction-oriented traffic. If you set both a start and a stop trigger, the start trigger can reenable saving traffic to a capture buffer. You can activate both a start trigger and a stop trigger on the same packet. In this case, only one packet is captured.

Saving captured data

By default, packet capture stops copying data to the capture buffer when the buffer becomes full. To configure a capture object to overwrite the data in the buffer with new data, run the `wrapping` command.

Use the command `capture save` to save captured network traffic from the capture buffer in memory to a file on the VPN Router disk. You must stop packet capture before you can save the buffer to a file. (See "Starting, stopping, and saving capture objects" on page 119.)

Memory considerations

The number of packet capture objects that are allocated on a VPN Router depends on the available contiguous memory. When you create a capture object, you can specify the capture buffer size (the default buffer size is 1 Mbyte).

You can create new capture objects until the maximum block size reaches 25 Mbyte. (The VPN Router does not allow you to reduce the maximum block size to less than 25 Mbyte.) If you allocate too much memory to packet capture buffers, you receive an error message suggesting a smaller buffer size.

To check the maximum block size, select **Status > Statistics** and click **Memory** in the Resources section. Scroll to the bottom of the window to find the maximum block size. The output looks similar to this:

```
Shared Heap Statistics:
 status   bytes    blocks   ave block  max block
 ------ --------- -------- ---------- ----------
current
   free  40542960       18    2252386  39532912
  alloc  64815872      135     480117         -
```

You can display the same information by entering the command `show status statistics resources memory`.

Performance considerations

Running packet capture can affect VPN Router performance. You can run only one capture object at one time for a specific source (interface or tunnel). Multiple capture objects can exist for the same source, but only one object is allowed to start. You can run capture objects for different sources at the same time with no limitations.

To reduce the effect on VPN Router performance, use packet capture for troubleshooting only and observe the following guidelines:

- Configure the capture object to capture the least amount of data needed for troubleshooting: for example, only inbound or outbound traffic, only the first *n* bytes of the packet.
- Configure a capture object for promiscuous mode only when necessary. (Promiscuous mode affects VPN Router performance.)
- Configure filters and triggers to capture only relevant traffic, in particular if you need to run the global IP object.

- Delete a capture object or capture files when you no longer need them to free up memory or disk space.
- Do not run capture objects for physical interfaces or tunnels at the same time that you run the global IP capture object (some packets are captured more than once).

Enabling packet capture on a VPN Router

You must have a serial connection to capture packets. You cannot enable packet capture through a Telnet session.

To prepare to run packet capture on the VPN Router:

1. If necessary, boot the VPN Router with a software version that has the PCAP feature.
2. Turn on the terminal or PC.
3. Configure the terminal or PC as follows:
   - 9600 baud
   - 8 data bits
   - 1 stop bit
   - No parity
   - No flow control
4. Connect the serial cable (supplied with the VPN Router) from the VPN Router serial port to the terminal or to the communications port on the PC.
5. On the PC, start HyperTerminal* or another terminal emulation program and click **Enter**.

   The Welcome window appears.

```
Welcome to the VPN Router
Copyright (c) 2007 Nortel Networks Ltd.

Version:            V04_90.185
Creation date:      May 27, 2004, 20:51:06
Date:               05/27/2004
Unit Serial Number: 317563

Please enter the administrator's user name:
```

6 Enter the administrator's user name and password.

```
Please enter the administrator's user name: admin

Please enter the administrator's password: *****
```

The serial main menu appears.

```
Main Menu: System is currently in NORMAL mode.

   1) Interfaces
   2) Administrator
   3) Default Private Route Menu
   4) Default Public Route Menu
   5) Create A User Control Tunnel(IPsec) Profile
   6) Restricted Management Mode FALSE
   7) Allow HTTP Management TRUE
   8) Firewall Options
   9) Shutdown
   B) System Boot Options
   P) Configure Serial Port
   C) Controlled Crash
   L) Command Line Interface
   R) Reset System to Factory Defaults
   E) Exit, Save and Invoke Changes

   Please select a menu choice (1 - 9,B,P,C,L,R,E): L
```

7 Access the command line interface by typing the letter **L** (uppercase or lowercase) at the prompt.

The User EXEC prompt appears:

```
CES>
```

8 Enter **Privileged EXEC** mode.

```
CES>enable
Password:*****
```

9 Enable **packet capture** globally on the VPN Router and create the capture password. Use this password to open capture files with the **openpcap** utility. Enter at least eight characters for the capture password and include at least one number.

```
CES#capture enable
Please specify password for encrypting capture files.
Password: ********
Reenter password: ********
```

10 If you want, you can now change the VPN Router administrator password.

```
CES#configure terminal
Enter configuration commands, one per line. End with
Ctrl/z.
CES(config)#adminname <admin_name> password <new_password>
CES(config)#exit
CES#
```

After you enable packet capture, it remains enabled until you explicitly disable it with the `no capture enable` command or until you reboot the VPN Router. You can now configure and start packet capture objects.

Capturing packets to disk file

To configure PCAP, you must first enter CLI Capture Configuration Mode. For more information about CLI Capture Configuration Mode, see *Nortel VPN Router Using the Command Line Interface*.

There are five CLI commands for capturing packets to disk file. These commands are:

- `filepath`—sets the PCAP file path
- `buffersize`—sets the size of the RAM buffer
- `filesize`—sets the size of a disk capture file
- `maxfiles`—sets the maximum number of disk capture files
- `capture-all`—sets PCAP capture mode to either loss or no loss

The following sections describe each of these commands.

Setting the PCAP file path

To set the file path to save PCAP files, from CLI Capture Configuration Mode, enter:

`filepath` *<path>*

where *path* is the path to save the PCAP files.

For example, enter:

```
CES(capture-ethernet)#filepath /ideX/system/log
```

Note: To back up later using the autobackup functionality, the specified file path for the PCAP files must be a directory under **/ideX/system**.

Setting the size of the RAM buffer

To set the RAM buffer size, from CLI Capture Configuration Mode enter:

buffersize <*size*>

where *size* is the size of the RAM buffer.

For example, enter:

```
CES(capture-ethernet)#buffersize 1048576
```

Setting the size of a disk capture file

To set the size of the disk capture file, from CLI Capture Configuration Mode enter:

filesize <*max_size*>

where *max_size* is the size of the capture file.

For example, enter:

```
CES(capture-ethernet)#filesize 10485760
```

Setting the maximum number of disk capture files

To set the maximum number of disk capture files, from CLI Capture Configuration Mode enter:

maxfiles <*max_files*>

where *max_files* is the maximum number of files to save to disk for this capture.

For example, enter:

```
CES(capture-ethernet)#maxfiles 99
```

Saving captured data

To set the PCAP capture mode to loss or no loss, from CLI Capture Configuration Mode enter:

capture-all

or

No capture-all

For example, enter:

```
CES(capture-ethernet)#capture-all
```

Configuring and running packet capture objects

This section provides instructions for creating, configuring, starting, and stopping capture objects, as well as instructions for saving captured traffic to a file on disk. For the complete syntax of the packet capture commands shown in this section, see the *Nortel VPN Router Using the Command Line Interface*.

Creating a capture object

To create a capture object, use the `capture add` command. (For information about the types of object that you can create, see "Capture types" on page 106.)

1 To view the types of capture objects that you can configure, enter the following command at the **Privileged EXEC** prompt.

```
CES# capture add <object_name> ?
```

For example, enter the following command:

```
CES# capture add test1 ?
 atm             ATM interface capture
 bri              Bri interface capture
 dial             Dial interface capture
 FastEthernet     Fast Ethernet interface capture
 GigabitEthernet  Gigabit Ethernet interface capture
 global           Global RAW IP capture
 serial           Serial interface capture
 tunnel           Tunnel capture
```

2 Create a capture object by specifying an object name and type.

In the following example, you create a capture object called test_ethernet1 that captures traffic on Ethernet interface 1/2.

```
CES# capture add test_ethernet1 FastEthernet 1/2
CES#
```

In the following example, you create a capture object called test_tunnel that captures tunnel traffic.

```
CES# capture add test_tunnel tunnel
CES#
```

Configuring a capture object

After you create a capture object, you can configure it to capture a subset of the traffic that travels over the physical interface, tunnel, or the VPN Router as a whole. You can configure a capture object to do the following:

- capture inbound or outbound traffic or both
- capture a non-default number of octets from each packet
- apply an interface filter to the object
- configure start and stop triggers for the object
- specify whether the capture stops when the buffer is full or whether new data overwrites the existing data

To configure a capture object:

1 Navigate to **Capture Configuration** mode by entering the `capture` command with the object name.

```
CES#capture ether0
CES(capture-ethernet)#
```

The resulting prompt shows the type of capture object (physical interface, tunnel, or global IP).

2 Display all parameters that you can configure for that type of capture object.

```
CES(capture-ethernet)#?
Packet capture mode
  direction        Captures in one direction
  exit             Exits capture mode
  filter           Applies interface traffic filter to
                     capture only matching traffic
  length             Specifies how many octets to capture for
                     every packet
  no               Disables features and settings
  promiscuous      Enables promiscuous mode when capture is
                     running
  trigger          Enables triggers
  wrapping         Continues capturing when buffer gets full
CES(capture-ethernet)#
```

3 Edit one or more parameters as required.

Note: The `promiscuous` parameter is available for Ethernet capture objects only.

For the syntax of any command, see the *Nortel VPN Router Using the Command Line Interface (NN46110-507)*.

Tunnel capture parameters

Capture objects for tunnels have several unique parameters. The following example creates a tunnel object called *bot1*, navigates to Capture Configuration mode, and displays the commands for tunnel objects. The commands in **bold** are the commands that are available only for tunnel objects. For more information about tunnel capture objects, see "Tunnel captures" on page 106.

```
CES#capture add bot1 tunnel
CES#capture bot1
CES(capture-tunnel)#?
Packet capture mode
  direction      Captures in one direction
  exit           Exits capture mode
  filter         Applies interface traffic filter to capture
                   only matching traffic
  length           Specifies how many octets to capture for
                   every packet
  no             Disables features and settings
  persistent       Restarts capture on session disconnect
  remoteip         Captures sessions from this IP address
  trigger        Enables triggers
  type             Captures only sessions of specific type
  userid           Captures sessions from this user
  wrapping         Continues capturing when buffer gets full
CES(capture-tunnel)#
```

For the syntax of any command, see the *Nortel VPN Router Using the Command Line Interface (NN46110-507)*.

Global IP parameters

The configurable parameters for the global IP capture object are the same as the parameters available for physical interface objects. The following example creates a global capture object called *rawip*, navigates to Capture Configuration mode, and displays the commands for the global capture object. For more information about global IP capture objects, see "Global IP captures" on page 107.

```
CES#capture add rawip global
CES#capture rawip
CES(capture-global)#?
Packet capture mode
  direction        Captures in one direction
  exit             Exits capture mode
  filter           Applies interface traffic filter to
                     capture only matching traffic
  length             Specifies how many octets to capture for
                     every packet
  no               Disables features and settings
  trigger          Enables triggers
  wrapping         Continues capturing when buffer gets full
CES(capture-global)#
```

Starting, stopping, and saving capture objects

The following example shows how to start a capture object called *test_ether1*, stop it, save the buffer to a file (called *test_ether1.cap*), and finally, clear the capture buffer. You must run all commands at Privileged EXEC mode.

```
CES#capture test_ether1 start
CES#capture test_ether1 stop
CES#capture test_ether1 save test_ether1.cap
Saving capture test_ether1 to file /ide0/test_ether1.cap please
wait . . .
220 frames written successfully
CES#clear capture test_ether1
CES#
```

Using the show capture command to display capture status

Use the `show capture` command to display a list of capture objects and to display the configuration and status of a specific capture object.

In the following example, the `show capture` command is run with no object name to display a list of all the capture objects configured on the VPN Router.

```
CES# show capture
Name         Type           Size     Buffer use   Count     State
bot1         TUNNEL         1048576     0%          0       EMPTY
ether0       ETHERNET       1048576     7%          984     STOPPED
rawip1       GLOBAL         1048576     0%          0       EMPTY
CES#
```

The following example shows the type of output you see when you enter the `show capture` command for a specific capture object.

```
CES# show capture bot1
Capture state:                              STOPPED
Capture buffer size:                        1048576
Capture type:                               TUNNEL
Tunnel type to capture:                     IPSEC
Tunnel encapsulation to capture:            INITIATOR
Restarting capture on tunnel logoff:        DISABLED
Capturing MAX octets per frame:             4096
Captured frames:                            0
Capture buffer utilization:                 0%
Capturing direction:                        BIDIRECTIONAL
Capture buffer wrapping:                    DISABLED
Capture buffer wrapped:                     FALSE
Capture filter applied:                     permit all
Capture filter discards:                    0
Start trigger applied:                      permit all
Start trigger discards:                     0
Stop trigger applied:                       permit all
CES#
```

Sample packet capture configurations

This section provides sample configurations and the commands used to create them.

Interface capture object using a filter and direction

In the following example, you configure a capture object called *test-filter-in* on Fast Ethernet interface 0/1. This object captures inbound FTP traffic only.

Note: The filter used in this example is a predefined VPN Router filter. If you need a filter that is not provided with VPN Router software, you must create the filter before you configure the capture object.

To create and use this capture object, you run commands like the ones illustrated in this example. These commands do the following:

1. Create a capture object called **test-filter-in** on **Fast Ethernet interface 0/1**.
2. Enter **Capture Configuration** mode for the object.
3. Set the direction for the capture to **inbound**.
4. Set the filter to capture **FTP traffic** only.
5. Exit **Capture Configuration** mode.
6. Start the capture.

```
CES#capture add test-filter-in FastEthernet 0/1
CES#capture test-filter-in
CES(capture-ethernet)##direction inbound
CES(capture-ethernet)#filter "permit FTP"
CES(capture-ethernet)#exit
CES#capture test-filter-in start
CES#
```

To view the status of the running capture object, as well as its configuration, use the `show capture` command. (In this example, 20 frames are captured in the buffer.)

```
CES#show capture test-filter-in
Capture state:                          RUNNING
Capture buffer size:                    1048576
Capture type:                           ETHERNET
Capturing on interface:                 FastEthernet 0/1
Promiscuous mode is:                    DISABLED
Capturing MAX octets per frame:         4096
Captured frames:                        20
Capture buffer utilization:             0%
Capturing direction:                    INBOUND
Capture buffer wrapping:                DISABLED
Capture buffer wrapped:                 FALSE
Capture filter applied:                 permit FTP
Capturing non-ip frames:                DISABLED
Capture filter discards:                329
CES#
```

To stop the capture and save the buffer contents to a file called *test3.cap*, enter the following commands:

```
CES#capture test-filter-in stop
CES#capture test-filter-in save test3.cap
Saving capture test-filter-in to file /ide0/test3.cap please wait .
. .
20 frames written successfully
CES#
```

Interface capture object using triggers

In the following example, you configure a capture object called *test-trigger* on Fast Ethernet interface 0/1. This object uses FTP traffic as the start trigger and Telnet traffic as the stop trigger.

Note: The filters used in this example are predefined VPN Router filters. If you need a filter that the VPN Router software does not provide, you must create the filter before you configure the capture object.

To create and use this capture object, you run commands like the ones illustrated in this example. These commands do the following:

1. Create a capture object called **test-trigger** on **Fast Ethernet interface 0/1**.
2. Enter **Capture Configuration** mode for the object.
3. Set the start trigger to **permit FTP**.
4. Set the stop trigger to **permit Telnet**.
5. Exit **Capture Configuration** mode.
6. Start the capture.

```
CES#capture add test-trigger fastethernet 0/1
CES#capture test-trigger
CES(capture-ethernet)#trigger start "permit FTP"
CES(capture-ethernet)#trigger stop "permit Telnet"
CES(capture-ethernet)#exit
CES#capture test-trigger start
CES#
```

To view the status of the running capture object, as well as its configuration, use the `show capture` command. In this example, you can see that:

- The *captured frames* field indicates that the capture was triggered by the receipt of FTP traffic.
- The *start trigger discards* field shows the number of packets discarded before the start trigger was activated by the receipt of FTP traffic.

```
CES#show capture test-trigger
Capture state:                          RUNNING
Capture buffer size:                    1048576
Capture type:                           ETHERNET
Capturing on interface:                 FastEthernet 0/1
Promiscuous mode is:                    DISABLED
Capturing MAX octets per frame:         4096
Captured frames:                        107
Capture buffer utilization:             0%
Capturing direction:                    BIDIRECTIONAL
Capture buffer wrapping:                DISABLED
Capture buffer wrapped:                 FALSE
Start trigger applied:                  permit FTP
Start trigger discards:                 362
Stop trigger applied:                   permit Telnet
CES#
```

After Telnet traffic activates the stop trigger, the `show capture` command resembles the following example. The *Capture state* field now shows that the capture was stopped by the stop trigger.

```
CES#show capture test-trigger
Capture state:                              STOPPED by stop
trigger
Capture buffer size:                        1048576
Capture type:                               ETHERNET
Capturing on interface:                     FastEthernet 0/1
Promiscuous mode is:                        DISABLED
Capturing MAX octets per frame:             4096
Captured frames:                            188
Capture buffer utilization:                 1%
Capturing direction:                        BIDIRECTIONAL
Capture buffer wrapping:                    DISABLED
Capture buffer wrapped:                     FALSE
Start trigger applied:                      permit FTP
Start trigger discards:                     362
Stop trigger applied:                       permit Telnet
CES#
```

To stop the capture object and save the buffer contents to a file called *test4.cap*, enter the following commands:

```
CES#capture test-trigger stop
CES#capture test-trigger save test4.cap
Saving capture test-trigger to file /ide0/test4.cap please wait . .
.
220 frames written successfully
CES#
```

Tunnel capture object using a remote IP address

In the following example, you configure a capture object called *test-remote-IP* that captures traffic arriving over a tunnel with the specified remote IP address.

To create and use this capture object, you run commands like the ones illustrated in this example. These commands do the following:

1. Create a capture object called **test-remote-ip**.
2. Enter **Capture Configuration** mode for the capture object.
3. Set the remote IP address to **192.168.100.1**.

4 Exit **Capture Configuration** mode.

5 Start the capture.

```
CES#capture add test-remote-ip tunnel
CES#capture test-remote-ip
CES(capture-tunnel)#remoteip 192.168.100.1
CES(capture-tunnel)#exit
CES#capture test-remote-ip start
CES#
```

To stop the capture and save the buffer contents to a file called *test6.cap*, enter the following commands:

```
CES#capture test-remote-ip stop
CES#capture test-remote-ip save test6.cap
Saving capture test-trigger to file /ide0/test6.cap please wait . .
.
10 frames written successfully
CES#
```

Viewing a packet capture output file on a PC

After you save a capture buffer to a file on the VPN Router disk, download the file to a workstation and analyze the contents offline using one of many available tools. The VPN Router does not provide utilities to view and analyze packet capture data; however, the VPN Router software CD provides a utility called **`openpcap`** that you use to open and decrypt PCAP files on a PC or workstation.

- To view a packet capture file with Ethereal* software, use the **`openpcap`** utility supplied with the VPN Router software.
- To view a packet capture file with Sniffer Pro* software, use the **`openpcap`** utility supplied with the VPN Router software along with the Ethereal **`editcap`** utility.

Installing Ethereal software

To install Ethereal (free of charge):

1 Log on to www.ethereal.com and click **Download**.

2 Locate the **Microsoft Windows** row and click **local archive**.

3 Click **ethereal-setup-*n.nn.n*.exe**.

4 Click a download site and save the executable file on your hard drive.

5 Double-click the executable file to install **Ethereal** software in the **c:\Program Files\Ethereal** directory.

6 After you install the software, click the **Ethereal** application to open the Ethereal window.

Saving, downloading, and viewing PCAP files

To save and download a PCAP file and view it using the VPN Router **openpcap** utility and Ethereal software:

1 On your PC, create a PCAP directory called **c:\pcap**.

2 In the **c:\pcap** directory, copy the **openpcap.exe** file that is provided with the VPN Router packet capture software.

3 On the VPN Router, stop the packet capture object and save the output to a file, for example:

```
CES#capture ethernet1 stop
CES#capture ethernet1 save ethernet.cap
Saving capture ethernet to file /ide0/ethernet.cap
please wait . . 82 frames written successfully.
```

Note: If you are running PCAP on a VPN Router that has two hard drives, save the PCAP files to directory **/ide1**.

4 On the PC, use **FTP** software to connect to the VPN Router and copy the **ethernet.cap** file located in the **/ide0/** directory to the **c:\pcap** directory on the PC.

5 Open a DOS window and from the c:\pcap directory, open the PCAP file **ethernet.cap** by using the **openpcap** executable. For example, enter this command (syntax is **openpcap** *<input_file> <output_file>*):

```
openpcap ethernet.cap ether1.cap
```

You are prompted for a password.

6 Enter the password that you entered when you enabled packet capture (see "Enabling packet capture on a VPN Router" on page 111).

Note: If you plan to use Sniffer Pro to view the capture file, go to the next section, "Viewing a PCAP file with Sniffer Pro" on page 127.

7 From the open **Ethereal** window, disable **Enable network name resolution**.

If this parameter is enabled, a large PCAP file takes a long time to open because every address captured tries to perform name address resolution.

8 Open the packet capture file (for example, **`ethernet.cap`**).

Viewing a PCAP file with Sniffer Pro

Because Sniffer Pro is not free shareware, it is assumed that you have already installed the software on the PC. To view a VPN Router PCAP file with Sniffer Pro:

1 Install **Ethereal** software (see "Installing Ethereal software" on page 125).

2 Save the packet capture file and download it to the PC as described in steps 1-6 of "Saving, downloading, and viewing PCAP files" on page 126.

3 Open a new DOS window and change directory to the **c:\Program Files\Ethereal** directory to access the **`editcap`** command.

4 Run the **`editcap`** command so that Sniffer Pro can view the capture. If the capture was done on an Ethernet interface or on a tunnel, type the extension **`.enc`**; if the capture was on done on WAN interface, type the extension **`.syc`**. Following are sample commands.

Ethernet interface capture:

```
editcap -F ngsniffer d:\pcap\ether.cap ether1.enc
```

IPsec tunnel capture:

```
editcap -T ether -F ngsniffer d:\pcap\ipsec.cap ipsec.enc
```

Global IP capture:

```
editcap -T ether -F ngsniffer d:\pcap\rawip.cap rawip.enc
```

T1 frame relay capture:

```
editcap -F ngsniffer d:\pcap\fr.cap frelay.syc
```

5 From **Sniffer Pro**, open the **.enc** file or the **.syc** file to view the trace.

For a global IP trace or tunnel trace, you must perform an extra step on Sniffer Pro because only Layer 3 traffic is recorded in the PCAP capture.

6 Before opening a global IP or tunnel trace, set the **Protocol Forcing** option in **Sniffer Pro** to view the correct Layer 3 information.

a Click **Tools > Options > Protocol Forcing**.

b Click **Rule 1** and specify if <Frame Start>, Skip 0 bytes, then Internet Protocol.

c Click **OK** and then open the file.

Deleting capture objects and disabling packet capture

When you no longer need a capture object, delete it to free up memory. You can also disable packet capture globally to remove all configured capture objects and free the memory used to store them.

Note: If you disable packet capture globally, you must use the serial port to re-enable it again (see "Enabling packet capture on a VPN Router" on page 111).

Any capture data that you saved in a file using the `capture save` command remains stored on the disk until you explicitly delete the file.

To delete a packet capture object:

1. Display all configured capture objects on the VPN Router to locate the object or objects that you want to delete.

```
CES#show capture
Name            Type       Size     Buffer use Count State
test-fast       ETHERNET   1048576      0%      10    STOPPED
test-filter-in  ETHERNET   1048576      0%      20    STOPPED
test-raw-ip     GLOBAL     1048576      0%      33    STOPPED
test-remote-ip  TUNNEL     1048576      0%      9     STOPPED
test-trigger    ETHERNET   1048576      1%      188   STOPPED by stop
trigger
test-user       TUNNEL      1048576     0%      56    STOPPED
CES#
```

2. Run the **no capture** command for the specific object.

   For example, the following command deletes the capture object *test-trigger*.

```
CES# no capture test-trigger
CES#
```

To disable packet capture globally and delete all configured capture objects, run the **no capture enable** command:

```
CES#no capture enable
CES#
```

Appendix A
MIB support

The VPN Router supports the management information base (MIB) for use with network management protocols in TCP/IP-based Internets and TCP/IPX-based networks. The VPN Router supports SNMP Gets only. It does not support SNMP Sets.

Nortel also provides proprietary MIBs for the VPN Router's SNMP trap support. The MIBs, cestraps.mib and newoak.mib, are available on the VPN Router distribution CD in the Doc directory.

SNMP RFC support

This section explains the SNMP-related RFCs that the VPN Router supports.

Novell IPX MIB

The VPN Router supports the IPX MIB that is distributed by Novell, Inc.

Novell RIP-SAP MIB

The VPN Router supports the IPX RIP-SAP MIB that Novell, Inc. distributes.

RFC 1850—OSPF Version 2 Management Information Base

The VPN Router supports RFC 1850, *OSPF Version 2 Management Information Base*. As stated in the introduction to the RFC, the RFC "defines a portion of the Management Information Base (MIB) for use with network management protocols in TCP/IP-based internets. In particular, it defines objects for managing the Open Shortest Path First Routing Protocol."

RFC 1724—RIP Version 2 MIB Extension

The VPN Router supports RFC 1724, *RIP Version 2 MIB Extension*. As stated in the introduction to the RFC, the RFC "defines a portion of the Management Information Base (MIB) for use with network management protocols in TCP/IP-based internets. In particular, it defines the objects for managing RIP Version 2."

RFC 1213—Network Management of TCP/IP-Based Internets MIB

The VPN Router supports RFC 1213, *Management Information Base for Network Management of TCP/IP-based Internets: MIB II*. This RFC provides the architecture and system for managing TCP/IP-based internets. With the exception of the EGP Group (Section 6.10) and the Transmission Group (Section 6.11), the VPN Router provides full support for the RFC.

SNMP interface index (IfIndex) numbers, as defined in RFC 1213, are numbers that third-party network management systems (NMS) rely on to monitor and gather statistics for devices through SNMP. The physical and virtual interfaces on the VPN Router are assigned these locally significant numbers and the NMS can use them to associate statistics with the devices.

Prior to Release 7.0, an IfIndex number was dynamically assigned to a branch office tunnel (BOT) when the BOT came up. Only up tunnels were reported. This enhancement does the following:

- assigns a static number to each branch office tunnel
- reports all branch office tunnels, whether they are up or down, in an SNMP query

RFC 2667—IP Tunnel MIB

The VPN Router supports RFC 2667, *IP Tunnel MIB*. As stated in the introduction to the RFC, it "describes a Management Information Base (MIB) used for managing tunnels of any type over IPv4 networks, including GRE [16,17], IP-in-IP [18], Minimal Encapsulation [19], L2TP [20], PPTP [21], L2F [25], UDP (e.g., [26]), ATMP [22], and IPv6-in-IPv4 [27] tunnels."

RFC 2787—VRRP MIB

The VPN Router supports RFC 2787, *Definitions of Managed Objects for the Virtual Router Redundancy Protocol*. As stated in the introduction, RFC 2787 "defines an extension to the Management Information Base (MIB) for use with SNMP-based network management. In particular, it defines objects for configuring, monitoring, and controlling routers that employ the Virtual Router Redundancy Protocol (VRRP)."

RFC 2737—Entity MIB

This MIB contains five tables two or which are partially implemented.

```
*entPhysicalTable
entLogicalTable
entLPMappingTable
*entAliasMappingTable
entPhysicalContainsTable
```

The entPhysicalTable provides a listing of the hardware elements that are present in the system. For example, each slot is listed and if there is a card in the slot, then the card and any ports on the card are listed. The exception to this is the hardware accelerator, which does not appear in the table. The listing shows element relationships through the columns entPhysicalContainedIn and entPhysicalParentRelPos. The only columns that are implemented are:

```
entPhysicalIndex
entPhysicalDescr (although the value is not strictly what the MIB
specifies)
entPhysicalContainedIn
entPhysicalClass
entPhysicalParentRelPos
entPhysicalName
entPhysicalIsFRU
```

All other columns return an appropriate default value for the object.

The entAliasMappingTable provides a mapping from entPhysicalIndex to ifTable.ifIndex. By walking this table, a management station can deter the ifIndex associated with a physical port.

RFC 1573—IanaIfType MIB

This MIB contains the enumerations for rfc2233 ifTable.ifType. These enumerations describe the various types of interfaces that ifTable can support.

RFC 2233—If MIB

This MIB is the latest evolution of rfc1213 Interfaces group, plus several new objects.

RFC 2571—Snmp-Framework MIB

This MIB provides textual conventions and object definitions used in the SNMP agent architecture.

RFC2790—Host Resources MIB

The Host Resources MIB defines a uniform set of objects for the managing host computers. Host computers are independent of the operating system, network services, or any software application. The Host Resources MIB defines objects that are common across many computer system architectures.

The VPN Router does not support the following groups or objects:

- hrSystem Group
  - hrSystemInitialLoadDevice
  - hrSystemInitialLoadParameters
  - hrSystemNumUsers
  - hrSystemProcesses
  - hrSystemMaxProcesses
- hrStorage Group

  hrStorageAllocationFailures
- hrDevice Group
  - hrDevice Table

    hrDeviceErrors

  - — hrNetworkTable
  - — hrPrinterTable
  - — hrDiskStorageTable

    hrDiskStorageCapacity
  - — hrPartitionTable

    hrPartitionSize
  - — hrFSTable

    hrFSLastFullBackupDate

    hrFSLastPartialBackupDate
- hrSWRun Group

  hrSWRun
- hrSWRunPerf Group

  hrSWRunPerf
- hrSWRunTable
  - — hrSWRunIndex
  - — hrSWRunName
  - — hrSWRunType
  - — hrSWRunStatus
  - — hrSWRunPriority
- hrSWRunPerfTable
  - — hrSWRunPerfCPU

RFC2495—DS1 MIB

These objects are used with a DS1/E1/DS2/E2 interface. At present, this applies to the ifType variable in the Internet-standard MIB ds1 (18).

This MIB provides an alternative reporting method for monitoring line status on a T1 line. ANSI reporting is still supported, but the reporting method is either ANSI or DS1 MIB.

RFC2863 Interface MIB (64 bit counters support)

The support for the following entries was added in the interface table: ifHCInOctets, ifHCInUcastPkts, ifHCOutOctets and ifHCOutUcastPkts. These counters already existed and were extended from Counter32 to Counter64.

VPN Router MIB

This MIB contains VPN Router proprietary MIB data. For instance the *ping MIB* is contained in this file. The ping MIB, through an SNMP GET REQUEST, causes the VPN Router to ping another device and get statistics based on the results of the ping. For instance sending a PDU specifying pingAverageTime.192.32.250.248.4.4076 sends four pings, of 4076 bytes, to address 192.32.250.248. (It actually sends five pings. One ping is sent by itself so that if the device being pinged is the other end of a Branch Office tunnel, it ensures that the tunnel is brought up before trying to send pings through the tunnel. This ping is not counted in the statistics.) The object returns the values of:

```
-2 Invalid parameter(indices).
-1 No reply.
0 Less than 16ms average time.
>0 The average time.
```

The objects and their parameters(indices) are:

```
pingAverageTime - returns the average ping time for the set of
specified pings.
pingPercentLoss - returns the percentage of loss.
```

The first index is the IP address to ping. The second index is the number of pings, if this is not specified or is an invalid value it defaults to 3. The third index is the size of the ping request. If it is not specified or is an invalid value then it defaults to 1024.

VPN Router MIB provides trap acknowledgement.

cestraps.mib—Nortel proprietary MIB

This section lists the contents of the cestraps.mib, the Nortel MIB for the VPN Router.

```
-- Trap #5005 ---------------------------------
--  Each Trap contains the Trap OID as well as the following OIDs:
--     SeverityLevel
--     System Name
--     System Date
--     System Time
--     System Uptime
--
       NEWOAKTRAP DEFINITIONS ::= BEGIN

       IMPORTS
           enterprises                FROM RFC1155-SMI
           DisplayString              FROM RFC1213-MIB
           OBJECT-TYPE                FROM RFC-1212
           TRAP-TYPE                  FROM RFC-1215;

    -- This MIB module uses the extended OBJECT-TYPE macro as
    -- defined in [9], and the TRAP-TYPE macro as defined in [10].

    contivity         OBJECT IDENTIFIER ::= { enterprises 2505 }


    ContivitySnmpTraps OBJECT-TYPE
        SYNTAX  DisplayString
        ACCESS  read-only
        STATUS  mandatory
        DESCRIPTION
        "Nortel Networks Inc's Enterprise trap."
    ::= {contivity 1}

-- Trap #5006 ---------------------------------
antiSpoofingStatus OBJECT-TYPE
SYNTAX DisplayString
ACCESS read-only
STATUS mandatory
DESCRIPTION "Status of Anti Spoofing Feature.
Possible Values:
Disabled: Anti-Spoofing is Disabled;
Warning: Anti-Spoofing : Packets Dropped;
Alert: Anti-Spoofing state not known!;
The values have the following meaning:
-- The first means the feature is disabled
```

```
-- The second means packets were dropped due to a detected spoofed
address
-- The third should never happen, but means the status has been set
to a bogus value.
"
::= {serviceCESTrapInfo 6}
antiSpoofingStatusTrap TRAP-TYPE
ENTERPRISE serviceCESTrapInfo
VARIABLES {
severityLevel, antiSpoofingStatus, systemName,systemDate,
systemTime, systemUpTime
}
DESCRIPTION "Status of Anti Spoofing Feature"
::= 5006
```

newoak.mib

This section provides the contents of the newoak.mib, which defines the *newoak* enterprise ID, the *contivity* object identifier, and the sysObjectIDs for each VPN Router model.

```
--  This MIB module uses the extended OBJECT-TYPE macro as
        --  defined in [9], and the TRAP-TYPE macro as defined in
[10].

        newoak    OBJECT IDENTIFIER ::= { enterprises 2505 }

-- The following MODULE-IDENTITY definition can be commented out if
the MIB parser
-- you are using has trouble parsing it. If you do comment it out,
then uncomment
-- the following object identifier definition.
--    contivity OBJECT IDENTIFIER ::= {newoak 1}
--
     contivity  MODULE-IDENTITY
          LAST-UPDATED "0004252130Z"  -- April 25, 2000 7:30pm EST
          ORGANIZATION "Nortel Networks,Inc."
          CONTACT-INFO
            "support@nortelnetworks.com
            Postal: Nortel Networks,Inc.
                    80 Central St.
                    Boxboro, MA 01719
            Tel:    +1 978 264 7100
            E-Mail: support@nortelnetworks.com"

          DESCRIPTION
              "This MIB defines the sysObjectIDs for different
               variations ofthe Convitiy Extranet Switch."
          ::= { newoak 1 }
-- IDENTIFIER ::= {newoak 1}
     contivityExtranetSwitch2000 OBJECT IDENTIFIER ::= {newoak 2}
     contivityExtranetSwitch1000 OBJECT IDENTIFIER ::= {newoak 3}
     contivityExtranetSwitch4500 OBJECT IDENTIFIER ::= {newoak 4}
     contivityExtranetSwitch15XX OBJECT IDENTIFIER ::= {newoak 5}
     contivityExtranetSwitch2500 OBJECT IDENTIFIER ::= {newoak 6}
     contivityExtranetSwitch2600 OBJECT IDENTIFIER ::= {newoak 7}
     contivityExtranetSwitch1600 OBJECT IDENTIFIER ::= {newoak 8}
     contivityExtranetSwitch4600 OBJECT IDENTIFIER ::= {newoak 9}

      END
```

Hardware-related traps

```
hardwareTrapInfo OBJECT IDENTIFIER
    ::= {ContivitySnmpTraps 1}

-- Trap #1001
hardDisk1Status OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS mandatory
    DESCRIPTION "Hard Disk Number 1 Status."
    ::= {hardwareTrapInfo 1}

-- Trap #1002
hardDisk0Status OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Hard Disk Number 0 Status."
    ::= {hardwareTrapInfo 2}

-- Trap #1003
memoryUsage OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Memory Usage Status."
    ::= {hardwareTrapInfo 3}

-- Trap #1004
LANcardStatus OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of any LAN cards on the system."
    ::= {hardwareTrapInfo 4}

-- Trap #1005
CPUtwoStatus OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of second CPU."
    ::= {hardwareTrapInfo 5}

-- Trap #1006
fanOneStatus OBJECT-TYPE
    SYNTAX  DisplayString
```

```
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of the first CPU fan."
    ::= {hardwareTrapInfo 6}

-- Trap #1007
fanTwoStatus OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of the second CPU fan."
    ::= {hardwareTrapInfo 7}

-- Trap #1008
chassisFanStatus OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of the Chassis fan."
    ::= {hardwareTrapInfo 8}

-- Trap #1009
fiveVoltsPositive OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of +5 Volt power."
    ::= {hardwareTrapInfo 9}

-- Trap #10010
fiveVoltsMinus OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of -5 Volt power."
    ::= {hardwareTrapInfo 10}

-- Trap #10011
threeVoltsPositive OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of +3 Volt power."
    ::= {hardwareTrapInfo 11}

-- Trap #10012
twoDotFiveVA OBJECT-TYPE
    SYNTAX  DisplayString
```

```
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of 2.5VA power."
    ::= {hardwareTrapInfo 12}

-- Trap #10013
twoDotFiveVB OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of 2.5VB power."
    ::= {hardwareTrapInfo 13}

-- Trap #10014
twelveVoltsPositive OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of +12 Volt power."
    ::= {hardwareTrapInfo 14}

-- Trap #10015
twelveVoltsMinus OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of -12 Volt power."
    ::= {hardwareTrapInfo 15}

-- Trap #10016
normalTemperature OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of normal temperature reading."
    ::= {hardwareTrapInfo 16}

-- Trap #10017
criticalTemperature OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of critical temperature reading."
    ::= {hardwareTrapInfo 17}

-- Trap #10018
chassisIntrusion OBJECT-TYPE
    SYNTAX  DisplayString
```

```
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "The chassis intrusion sensor indicates that
                 the unit has been opened."
    ::= {hardwareTrapInfo 18}

-- Trap #10019
dualPowerSupply OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of the redundant power supplies."
    ::= {hardwareTrapInfo 19}

-- Trap #10020
t1WANStatus OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of T1 WAN card(s)."
    ::= {hardwareTrapInfo 20}

-- Trap #10021
t3WANStatus OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of T3 WAN card(s)."
    ::= {hardwareTrapInfo 21}
```

Server-related traps

```
serverTrapInfo OBJECT IDENTIFIER
    ::= {ContivitySnmpTraps 2}

-- Trap #3001
radiusAcctServer OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of External Radius Accounting Server."
    ::= {serverTrapInfo 1}

-- Trap #3002
backupServer OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of External Disk Backup Server."
    ::= {serverTrapInfo 2}

-- Trap #3003
diskRedundency OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of Local Disk Redundancy."
    ::= {serverTrapInfo 3}

-- Trap #3004
IntLDAPServer OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of Internal LDAP Server."
    ::= {serverTrapInfo 4}

-- Trap #3005
LoadBalancingServer OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of Load Balancing Server."
    ::= {serverTrapInfo 5}

-- Trap #3006
DNSServer OBJECT-TYPE
    SYNTAX  DisplayString
```

```
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of DNS Server."
    ::= {serverTrapInfo 6}

-- Trap #3007
SNMPServer OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of SNMP Server."
    ::= {serverTrapInfo 7}

-- Trap #3008
IPAddressPool OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of the IP address pool."
    ::= {serverTrapInfo 8}

-- Trap #3009
ExtLDAPServer OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of External LDAP Server."
    ::= {serverTrapInfo 9}

-- Trap #30010
radiusAuthServer OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of Radius Authentication Server."
    ::= {serverTrapInfo 10}

-- Trap #30011
   certificateServer OBJECT-TYPE
       SYNTAX  DisplayString
       ACCESS  read-only
       STATUS  mandatory
       DESCRIPTION "Status of Certificates Validity."
       ::= {serverCESTrapInfo 11}
```

Software-related traps

```
softwareTrapInfo OBJECT IDENTIFIER
    ::= {ContivitySnmpTraps 3}

-- Trap #5001
NetBuffers OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Network buffer usage."
    ::= {softwareTrapInfo 1}

-- Trap #5002
fireWall OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Status of internal firewall."
    ::= {softwareTrapInfo 2}
```

Login-related traps

```
loginTrapInfo OBJECT IDENTIFIER
    ::= {ContivitySnmpTraps 4}

    -- Trap #101
    failedLogin OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Failed Login Attempt."
    ::= {loginTrapInfo 1}
```

Intrusion-related traps

```
intrusionTrapInfo OBJECT IDENTIFIER
  ::= {ContivitySnmpTraps 5}

-- Trap #201
securityIntrusion OBJECT-TYPE
  SYNTAX  DisplayString
  ACCESS  read-only
  STATUS  mandatory
  DESCRIPTION "Login Security Intrusion."
  ::= {intrusionTrapInfo 1}
```

System-related traps

```
-- Trap #401
powerUpTrap OBJECT-TYPE
    SYNTAX DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Power Up."
    ::= {ContivitySnmpTraps 6}

-- Trap #601
periodicHeartbeat OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "Periodic Heartbeat."
    ::= {ContivitySnmpTraps 12}
```

Information passed with every trap

```
SeverityLevel OBJECT-TYPE
    SYNTAX INTEGER
    {
    fatal(1),
    major(2),
    minor(3),
    informational(4),
    insignificant(5),
    reversal(6)
    }
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION "Severity of specific trap."
        ::= {ContivitySnmpTraps 7}
systemName OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "System Name."
    ::= {ContivitySnmpTraps 8}

systemDate OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "System Date."
    ::= {ContivitySnmpTraps 9}

systemTime OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "System Time."
    ::= {ContivitySnmpTraps 10}

systemUpTime OBJECT-TYPE
    SYNTAX  DisplayString
    ACCESS  read-only
    STATUS  mandatory
    DESCRIPTION "System Up Time."
    ::= {ContivitySnmpTraps 11}
```

Table 3 provides trap categories and explanations.

Table 3 Trap categories

Hardware	
1.3.6.1.4.1.2505.1.1.0.1001	hardDisk1StatusTrap
1.3.6.1.4.1.2505.1.1.0.1002	hardDisk0StatusTrap
1.3.6.1.4.1.2505.1.1.0.1003	memoryUsageTrap
1.3.6.1.4.1.2505.1.1.0.1004	lanCardStatusTrap
1.3.6.1.4.1.2505.1.1.0.1005	cpuTwoStatusTrap
1.3.6.1.4.1.2505.1.1.0.1006	fanOneStatusTrap
1.3.6.1.4.1.2505.1.1.0.1007	fanTwoStatusTrap
1.3.6.1.4.1.2505.1.1.0.1008	chassisFanStatusTrap
1.3.6.1.4.1.2505.1.1.0.1009	fiveVoltsPosStatusTrap
1.3.6.1.4.1.2505.1.1.0.10010	fiveVoltsMinusTrap
1.3.6.1.4.1.2505.1.1.0.10011	threeVoltsPositiveTrap
1.3.6.1.4.1.2505.1.1.0.10012	twoDotFiveVATrap
1.3.6.1.4.1.2505.1.1.0.10013	twoDotFiveVBTrap
1.3.6.1.4.1.2505.1.1.0.10014	twelveVoltsPositveTrap
1.3.6.1.4.1.2505.1.1.0.10015	twelveVoltsMinsTrap
1.3.6.1.4.1.2505.1.1.0.10016	normalTemperatureTrap
1.3.6.1.4.1.2505.1.1.0.10017	criticalTemperatureTrap
1.3.6.1.4.1.2505.1.1.0.10018	chassisIntrusionTrap
1.3.6.1.4.1.2505.1.1.0.10019	dualPowerSupplyTrap
1.3.6.1.4.1.2505.1.1.0.10020	t1WANStatusTrap
1.3.6.1.4.1.2505.1.1.0.10021	t3WANStatusTrap
1.3.6.1.4.1.2505.1.1.0.10022	hwAccelTrap
Server	
1.3.6.1.4.1.2505.1.2.0.3001	radiusAcctServerTrap
1.3.6.1.4.1.2505.1.2.0.3002	backupServerTrap
1.3.6.1.4.1.2505.1.2.0.3003	diskRedundencyTrap
1.3.6.1.4.1.2505.1.2.0.3004	intLDAPServerTrap
1.3.6.1.4.1.2505.1.2.0.3005	loadBalancingServerTrap
1.3.6.1.4.1.2505.1.2.0.3006	dnsServerTrap

Table 3 Trap categories (continued)

Server	
1.3.6.1.4.1.2505.1.2.0.3007	snmpServerTrap
1.3.6.1.4.1.2505.1.2.0.3008	ipAddressPoolTrap
1.3.6.1.4.1.2505.1.2.0.3009	extLDAPServerTrap
1.3.6.1.4.1.2505.1.2.0.30010	radiusAuthServerTrap
1.3.6.1.4.1.2505.1.2.0.30011	certificateServerTrap
Software	
1.3.6.1.4.1.2505.1.3.0.5001	netBuffersTrap
1.3.6.1.4.1.2505.1.3.0.5002	FireWallTrap
1.3.6.1.4.1.2505.1.3.0.5003	FipsStatusTrap
Failed Login	
1.3.6.1.4.1.2505.1.4.0.101	FailedLoginTrap
Intrusion	
1.3.6.1.4.1.2505.1.5.0.201	SecurityIntrusionTrap
Presence	
1.3.6.1.4.1.2505.1.0.401	PowerUpTrapEntry
1.3.6.1.4.1.2505.1.0.601	PeriodicHeartbeatTrap

Table 4 provides descriptions for the VPN Router traps.

Table 4 VPN Router traps MIB descriptions

Standard / Proprietary OID	OID	Name	Description
Proprietary	1.3.6.1.4.1.2505.1.1.0.1001	hardDisk1StatusTrap	Hard Disk Number 1 Status.
Proprietary	1.3.6.1.4.1.2505.1.1.0.1002	hardDisk0StatusTrap	Hard Disk Number 0 Status.
Proprietary	1.3.6.1.4.1.2505.1.1.0.1003	memoryUsageTrap	Memory Usage Status.
Proprietary	1.3.6.1.4.1.2505.1.1.0.1004	fanCardStatusTrap	Status of any LAN cards on the system.
Proprietary	1.3.6.1.4.1.2505.1.1.0.1005	cpuTwoStatusTrap	Status of second CPU.
Proprietary	1.3.6.1.4.1.2505.1.1.0.1006	fanOneStatusTrap	Status of the first CPU fan.
Proprietary	1.3.6.1.4.1.2505.1.1.0.1007	fanTwoStatusTrap	Status of the second CPU fan.
Proprietary	1.3.6.1.4.1.2505.1.1.0.1008	chassisFanStatusTrap	Status of the chassis fan.

Table 4 VPN Router traps MIB descriptions

Proprietary	1.3.6.1.4.1.2505.1.1.0.1009	fiveVoltsPosStatusTrap	Status of the +5 Volt power.
Proprietary	1.3.6.1.4.1.2505.1.1.0.10010	fiveVoltsMinusTrap	Status of -5 Volt power.
Proprietary	1.3.6.1.4.1.2505.1.1.0.10011	threeVoltsPositiveTrap	Status of +3 Volt power.
Proprietary	1.3.6.1.4.1.2505.1.1.0.10012	twoDotFiveVATrap	Status of 2.5VA power.
Proprietary	1.3.6.1.4.1.2505.1.1.0.10013	twoDotFiveVBTrap	Status of 2.5VB power.
Proprietary	1.3.6.1.4.1.2505.1.1.0.10014	twelveVoltsPositveTrap	Status of +12 Volt power.
Proprietary	1.3.6.1.4.1.2505.1.1.0.10015	twelveVoltsMinsTrap	Status of -12 Volt power.
Proprietary	1.3.6.1.4.1.2505.1.1.0.10016	normalTemperatureTrap	Status of the normal temperature reading.
Proprietary	1.3.6.1.4.1.2505.1.1.0.10017	criticalTemperatureTrap	Status of the critical temperature reading.
Proprietary	1.3.6.1.4.1.2505.1.1.0.10018	chassisIntrusionTrap	The chassis intrusion sensor indicates that the unit is physically opened.
Proprietary	1.3.6.1.4.1.2505.1.1.0.10019	dualPowerSupplyTrap	Status of the redundant power supplies.

Table 4 VPN Router traps MIB descriptions

Proprietary	1.3.6.1.4.1.2505.1.1.0.10020	t1WANStatusTrap	Status of T1 WAN card(s); Possible values for Wanic: Alert: Invalid Device X. Warning: Device WanicX disabled. Alert: Device WanicX down. Warning: Device WanicX not initialized. Warning: Device WanicX PPP negotiating. Alert: Device WanicX PPP down. Alert: Device WanicX FR no support. Alert: Device WanicX Unknown DL. Possible values for T1: Alert: Invalid Device X. Warning: Device LMCDTEX disabled. Alert: Device LMCDTEX down. Warning: Device LMCDTEX not initialized. Possible values for CSU/DSU: Alert: Invalid Device X. Warning: Device LMCCDX disabled. Alert: Device LMCCDX down. Warning: Device LMCCDX not initialized.
Proprietary	1.3.6.1.4.1.2505.1.1.0.10021	t3WANStatusTrap	Status of T3 WAN card Possible Values: Alert: Invalid Index X. Warning: Device HSSIX disabled. Alert: Device HSSIX down. Warning: Device HSSIX not initialized. Alert: Device HSSIX PPP down. Warning: Device HSSIX PP initializing.

Table 4 VPN Router traps MIB descriptions

Proprietary	1.3.6.1.4.1.2505.1.1.0.10022	hwAccelTrap	Status of hardware accelerator card. Possible Values: Invalid hardware accelerator unit %d. Unknown hardware accelerator unit %d. Healthy: Bulk Accelerator in slot %d: Unit %d Status 1—ATTACHED. Warning: Bulk Accelerator in slot %d: Unit %d Status 2—DISABLED. Healthy: Bulk Accelerator in slot %d: Unit %d Status 3—ACTIVE. Warning: Bulk Accelerator in slot %d: Unit %d Status 4—RECOVERING. Warning: Bulk Accelerator in slot %d: Unit %d Status 5—SHUTDOWN. Alert: Bulk Accelerator in slot %d: Unit %d Status 6—FAILED.
Proprietary	1.3.6.1.4.1.2505.1.1.0.10023	heartBeat	This is trap 601—see above.

Table 4 VPN Router traps MIB descriptions

Proprietary	1.3.6.1.4.1.2505.1.1.0.10024	v90WANStatusTrap	Status of V.90 Interface card. Possible Values: Please note that X corresponds to the unit number of the card. Alert: V.90 Invalid index X. Disabled: Device IntModem-X disabled. Healthy: Device IntModem-X: PPP is UP. Alert: Device IntModem-X down. Warning: Device IntModem-X not initialized. Alert: Device IntModem-X: Call is UP. Internal Error. Warning: Device IntModem-X is Down. Last dial-out attempt FAILED. Healthy: Device IntModem-X is Down (No Active calls). Warning: Device IntModem-X is in an UNKNOWN state.
Proprietary	1.3.6.1.4.1.2505.1.1.0.10025	briWANStatusTrap	Status of ISDN BRI Interface card. Possible Values: Please note that X corresponds to the unit number of the card. Alert: BRI Invalid index X. Alert: Device BRI-X not Responding. Needs Host Reboot. Disabled: Device BRI-X disabled. Alert: Device BRI-X down. Warning: Device BRI-X not initialized. Healthy: Device BRI-X: PPP is UP. Alert: Device BRI-X: Call is UP. Internal Error. Warning: Device BRI-X is Down. Last dial-out attempt FAILED. Healthy: Device BRI-X is Down (No Active calls). Alert: Device BRI-X is in an UNKNOWN state.

Table 4 VPN Router traps MIB descriptions

Proprietary	1.3.6.1.4.1.2505.1.1.0.10026	serUartStatusTrap	Status of Serial (COM) port/ interface. Possible Values: Please note that X corresponds to the unit number of the serial interface. Alert: COM port Invalid index X Healthy: Device COMX is set for Serial Menu. Disabled: Device COMX disabled Warning: Device COMX not initialized. Healthy: Device COMX: PPP is UP. Alert: Device COMX: Call is UP. Internal Error. Warning: Device COMX is Down. Last dial-out attempt FAILED. Healthy: Device COMX is Down (No Active calls). Alert: Device COMX is in an UNKNOWN state.
Proprietary	1.3.6.1.4.1.2505.1.1.0.10027	adslWANStatusTrap	Status of ADI ADSL card. Possible Values: Please note that X corresponds to the unit number of the serial interface. Alert: Invalid index X. Alert: Device ADIADSLX off line. Disabled: Device ADIADSLX disabled. Alert: Device ADIADSLX down. Warning: Device ADIADSLX not initialized. Healthy: Device ADIADSLX up.
Proprietary	1.3.6.1.4.1.2505.1.2.0.3001	radiusAcctServerTrap	Status of External Radius Accounting Server.
Proprietary	1.3.6.1.4.1.2505.1.2.0.3002	backupServerTrap	Status of External Disk Backup Server.
Proprietary	1.3.6.1.4.1.2505.1.2.0.3003	diskRedundencyTrap	Status of Local Disk Redundancy.
Proprietary	1.3.6.1.4.1.2505.1.2.0.3004	intLDAPServerTrap	Status of Internal LDAP Server.

Table 4 VPN Router traps MIB descriptions

Proprietary	1.3.6.1.4.1.2505.1.2.0.3005	loadBalancingServerTrap	Status of Load Balancing Server.
Proprietary	1.3.6.1.4.1.2505.1.2.0.3006	dnsServerTrap	Status of DNS Server.
Proprietary	1.3.6.1.4.1.2505.1.2.0.3007	snmpServerTrap	Status of SNMP Server.
Proprietary	1.3.6.1.4.1.2505.1.2.0.3008	ipAddressPoolTrap	Status of the IP address pool.
Proprietary	1.3.6.1.4.1.2505.1.2.0.3009	extLDAPServerTrap	Status of External LDAP Server.
Proprietary	1.3.6.1.4.1.2505.1.2.0.30010	radiusAuthServerTrap	Status of Radius Authentication Server.
Proprietary	1.3.6.1.4.1.2505.1.2.0.30011	certificateServerTrap	Status of Certificates Validity. Possible Values: Healthy: Certificates Validity: Operational. Alert: Certificates Validity: All certificates are going to expire/ expired. Warning: Certificates Validity: One more certificate is invalid. Disabled: Certificates Validity: No certificate defined.
Proprietary	1.3.6.1.4.1.2505.1.2.0.30012	extLDAPAuthServerTrap	Status of External LDAP Authentication Server. Possible Values: Warning: External LDAP Authentication Server: Server is down (indicates at least one server is not reachable and at least one server is reachable). Alert: External LDAP Authentication Server: Server is down (indicates all servers are not reachable).
Proprietary	1.3.6.1.4.1.2505.1.2.0.30013	cmpServerTrap	Status of CMP Server. Possible Values: One/more Certificate Requests error: there is at least one request error. One/more Certificate Requests processing: there is at least one request in processing. No Certificate Requests submitted: there is no request sent.

Table 4 VPN Router traps MIB descriptions

Proprietary	1.3.6.1.4.1.2505.1.2.0.30014	dhcpServerTrap	Status of DHCP Server. Possible Values: Disabled: DHCP Server is Disabled. Alert: DHCP Server is NOT configured. Alert: DHCP Server is configured and operational, Using backup config. Alert: No IP Address available for subnet. Alert: DHCP Server is configured and server is DOWN. Healthy: DHCP Server is Operational. Warning: Subnet low on IP Addresses. Warning: DHCP Server Initializing. Warning: DHCP Server is Enabled, but status Unknown cannot be determined.
Proprietary	1.3.6.1.4.1.2505.1.3.0.5001	netBuffersTrap	Network buffer usage.
Proprietary	1.3.6.1.4.1.2505.1.3.0.5002	fireWallTrap	Status of internal firewall.
Proprietary	1.3.6.1.4.1.2505.1.3.0.5003	fipsStatusTrap	Status of FIPS.
Proprietary	1.3.6.1.4.1.2505.1.3.0.5004	licensingStatusTrap	Status temporary SW Licenses.
Proprietary	1.3.6.1.4.1.2505.1.3.0.5005	natStatusTrap	Status of Network Address Translator.
Proprietary	1.3.6.1.4.1.2505.1.3.0.5006	antiSpoofingStatusTrap	Status of Anti Spoofing Feature.

Table 4 VPN Router traps MIB descriptions

Proprietary	1.3.6.1.4.1.2505.1.3.0.5007	sslVpnStatusTrap	Status of SSL-VPN Accelerator. Possible Values: Disabled: Disabled—The unit is administratively disabled. Disabled: HW not installed—There is no SSL-VPN Accelerator installed. Warning: Initialization in progress—The unit is being intialized. Warning: Configuration errors—See eventlog for details. Healthy: Operational—The unit is operational. Alert: Unreachable: Error communicating with SSL-VPN.
Proprietary	1.3.6.1.4.1.2505.1.4.0.101	failedLoginTrap	Failed Login Attempt.
Proprietary	1.3.6.1.4.1.2505.1.5.0.201	securityIntrusionTrap	Login Security Intrusion.
Standard	1.3.6.1.2.1.11.0.0	coldStart	A coldStart trap signifies that the SNMPv2 entity, acting in an agent role, is re-initializing itself and that its configuration may be altered.

Table 4 VPN Router traps MIB descriptions

Standard	1.3.6.1.2.1.11.0.2	linkDown	A linkDown trap signifies that the sending protocol entity recognizes a failure in one of the communication links represented in the agent's configuration. Varbind list: ifIndex—ifIndex of the interface. ifAdminStatus—ifAdminStatus of the interface. ifOperStatus—ifOperStatus of the interface. ifDescr—ifDescr of the interface. ifType—ifType, this provides discrimination of interfaces that are tunnels. ifReasonForStatus-ces—reason for the change in status. ifPhysLocation-ces—this is the slot number. ifPhysRelPos-ces—the port number on the board defined in interfacePhysLocation. ifIpAddr-ces—IP address assigned to the phys port or the local IP address of a tunnel. ifName-ces—Name of the tunnel or physical interface. ifTunnelRemoteIpAddr-ces—for non-tunnel interfaces it is zero. sysObjectID—sysObjectID of the unit. sysName—sysName of the unit.

Table 4 VPN Router traps MIB descriptions

Standard	1.3.6.1.2.1.11.0.3	linkUp	A linkUp trap signifies that the sending protocol entity recognizes that one of the communication links represented in the agent's configuration is up. Varbind list: ifIndex—ifIndex of the interface. ifAdminStatus—ifAdminStatus of the interface. ifOperStatus—ifOperStatus of the interface. ifDescr—ifDescr of the interface. ifType—ifType, this provides discrimination of interfaces that are tunnels. ifReasonForStatus-ces—reason for the change in status. ifPhysLocation-ces—this is the slot number. ifPhysRelPos-ces—the port number on the board defined in interfacePhysLocation. ifIpAddr-ces—IP address assigned to the phys port or the local IP address of a tunnel. ifName-ces—Name of the tunnel or physical interface. ifTunnelRemoteIpAddr-ces—for non-tunnel interfaces it is zero. sysObjectID—sysObjectID of the unit. sysName—sysName of the unit.

Table 4 VPN Router traps MIB descriptions

Standard	1.3.6.1.2.1.11.0.5	authenticationFailure	n authenticationFailure trap signifies that the SNMPv2 entity, acting in an agent role, received a protocol message that is not properly authenticated. The snmpEnableAuthenTraps object indicates whether this trap is generated. snmpAuthenOperation-ces identifies the operation(ie. GetRequest, GetNextRequest,...) was attempted. snmpAuthenIpAddress-ces identifies the source IP address of the operation. snmpAuthenCommString-ces identifies the community string used in the operation.
Proprietary	1.3.6.1.4.1.2505.1.14.3.0.1	firewallRuleTriggeredTrap	An event sent at the user's request to signal that a rule is matched. firewallPolicyType-ces—Policy type. firewallRuleType-ces—Type of rule that triggered this event. firewallRuleNumber-ces—Number of the rule that triggered this event. ifIndex—ifIndex is the index into the ifTable for port that received the packet. ifName-ces—The name of the interface, same as ifName. firewallSrcAddr-ces—Source IP address of the packet. firewallSrcPort-ces—Source port address of the packet. firewallDestAddr-ces—Destination IP address of the packet. firewallDestPort-ces—Destination port of the packet. firewallProtocolID-ces—The value of the protocol field in the IP header. firewallRuleAction-ces—Action defined for the triggered rule.

Table 4 VPN Router traps MIB descriptions

Standard	1.3.6.1.2.1.11.0.2	linkDown	A linkDown trap signifies that the sending protocol entity recognizes a failure in one of the communication links represented in the agent's configuration. Varbind list: ifIndex—ifIndex of the interface. ifAdminStatus—ifAdminStatus of the interface. ifOperStatus—ifOperStatus of the interface. ifDescr—ifDescr of the interface. ifType—ifType, this provides discrimination of interfaces that are tunnels. ifReasonForStatus-ces—reason for the change in status. ifPhysLocation-ces—this is the slot number. ifPhysRelPos-ces—the port number on the board defined in interfacePhysLocation. ifIpAddr-ces—IP address assigned to the phys port or the local IP address of a tunnel. fName-ces—Name of the tunnel or physical interface. ifTunnelRemoteIpAddr-ces—for non-tunnel interfaces it is zero. sysObjectID—sysObjectID of the unit. sysName—sysName of the unit.

Table 4 VPN Router traps MIB descriptions

Standard	1.3.6.1.2.1.11.0.3	linkUp	A linkUp trap signifies that the sending protocol entity recognizes that one of the communication links represented in the agent's configuration is up. Varbind list: ifIndex—ifIndex of the interface ifAdminStatus—ifAdminStatus of the interface. ifOperStatus—ifOperStatus of the interface. ifDescr—ifDescr of the interface. ifType—ifType, this provides discrimination of interfaces that are tunnels. ifReasonForStatus-ces—reason for the change in status. ifPhysLocation-ces—this is the slot number. ifPhysRelPos-ces—the port number on the board defined in interfacePhysLocation. ifIpAddr-ces—IP address assigned to the physical port or the local IP address of a tunnel. ifName-ces—Name of the tunnel or physical interface. ifTunnelRemoteIpAddr-ces—for non-tunnel interfaces it is zero. sysObjectID—sysObjectID of the unit. sysName—sysName of the unit.

Table 4 VPN Router traps MIB descriptions

Standard	1.3.6.1.2.1.11.0.5	authenticationFailure	An authenticationFailure trap signifies that the SNMPv2 entity, acting in an agent role, received a protocol message that is not properly authenticated. The snmpEnableAuthenTraps object indicates whether this trap is generated. snmpAuthenOperation-ces identifies the operation (GetRequest, GetNextRequest,...) was attempted. snmpAuthenIpAddress-ces identifies the source IP address of the operation. snmpAuthenCommString-ces identifies the community string used in the operation.
Proprietary	1.3.6.1.4.1.2505.1.14.3.0.1	firewallRuleTriggeredTrap	An event sent at the user's request to signal that a rule is matched. firewallPolicyType-ces—Policy type. firewallRuleType-ces—Type of rule that triggered this event. firewallRuleNumber-ces—Number of the rule that triggered this event. ifIndex—ifIndex is the index into the ifTable for port that received the packet. ifName-ces—The name of the interface, same as ifName. firewallSrcAddr-ces—Source IP address of the packet. firewallSrcPort-ces—Source port address of the packet. firewallDestAddr-ces—Destination IP address of the packet. firewallDestPort-ces—Destination port of the packet. firewallProtocolID-ces—The value of the protocol field in the IP header. firewallRuleAction-ces—Action defined for the triggered rule.

Appendix B
Using serial PPP

You use Serial Point-to-Point Protocol (PPP) to manage the VPN Router from a remote location using PPP and the serial interface. If the VPN Router becomes unreachable over the Internet, you can still dial up and manage it through the serial interface menu.

With this feature, the serial interface becomes like a private WAN interface. You can manage through it or even tunnel through it. You can enable Serial PPP support on the System > Settings window. When configuring Serial PPP, you can set the VPN Router to Auto Detect, or you can specify that either PPP or the Serial Menu are the options available through the serial port.

The Password Authentication Protocol (PAP) performs Serial PPP authentication, which uses a standard user ID and sends a password in the clear. When authenticated, the serial interface acts like a private WAN interface.

Establishing a serial PPP connection

To enable Serial PPP:

1. Set up a Dial-Up Networking connection.
2. Set up the modem.
3. Set up the VPN Router.
4. Dial into the VPN Router using the Primary Administrator's user name and password.

Setting up a Dial-Up Networking connection

To establish a Serial PPP connection using a Microsoft Dial-Up Networking connection from the client system:

1. Double-click **My Computer**.
2. Double-click the **Microsoft Dial-Up Networking icon**.
3. Set the **COM port baud rate** on the client system so that it is compatible with the VPN Router's baud rate. It is best to set the rates the same to establish a connection. Possible rates are:
   - 9600 (default)
   - 19200
   - 38400
   - 56000
4. Go to **Server Types**, and under **Type of Dial-Up Server**, select **PPP: Internet, Windows NT Server, Windows 95**. Make sure that none of the Advanced options are set.
5. Go to **Allowed network protocols**, and select **TCP/IP**.
6. Go to **TCP/IP Settings**, and specify your IP address. This is the Management IP address that the VPN Router uses to communicate with the client that is dialing in through the modem.
7. Click **Server Assigned name server addresses**.
8. Unclick **IP header compression**.
9. Click **Use default gateway** on remote network.
10. Do not configure **Scripting** and **Multilink**.
11. Click **Configure the client modem**, and use the following settings:
    - 8 data bits
    - 1 stop bit
    - No parity
    - Hardware flow control

    Do not choose **Log On to Network** if the selection appears.

Setting up the modem

The following procedure assumes that you are using a 3Com/US Robotics 56K x2 modem. It describes how to set up a modem to communicate with the VPN Router using a dial-up networking connection. Table 5 lists the DIP switch settings.

Table 5 DIP switch configuration

Parameter	Setting
Data Terminal Ready	On
Verbal Result Codes	On
Suppress Result Codes	On
Echo Offline Commands	Off
Auto Answer (must be set)	On
Carrier Detect Normal	On
Load NVRAM Defaults	On
Dumb Mode	Off

Setting up the VPN Router

To set up the VPN Router's parameters through the Web interface:

1 Select **System > Settings.**

2 Under the **Serial Port** option, select one of the following modes of operation :

- Serial Menu (default)—leaves the VPN Router's serial interface in the traditional serial menu mode. In this mode, no serial PPP is supported. When connecting a program such as Hyper Terminal to the interface, the standard serial interface menu appears. In **Auto Detect** mode, if you are using a terminal emulator, such as Hyper Terminal, you must press **Enter** several times to get the logon and password prompt. Also, you can ignore the modem initialization string (which can or cannot be in use) that is displayed on the Hyper Terminal window.
- PPP—you can set up the VPN Router to use Point-to-Point Protocol (PPP) over the serial port. You can use this feature to manage the VPN Router from a remote location using PPP and the serial interface. If the VPN Router becomes unreachable over the Internet, you can still dial up and manage it through the serial interface menu. You can use this feature

to access all management services (HTTP, Telnet, FTP, SNMP) through the Web interface. Once you establish a session through PPP, the serial interface acts as a private WAN interface with an internal IP address (0.0.1.35).

- Auto detect—automatically detects whether the connected device is using PPP or serial menu mode at startup. The VPN Router cannot determine the device's baud rate, nor can it determine a change from PPP to serial menu mode, except upon startup. Auto Detect checks the mode each time the VPN Router is restarted. When performing its Auto Detect check, the VPN Router sends out AT command set characters to configure a modem if one is attached.

  When the VPN Router is in **Auto Detect** mode, and if a terminal session is connected and the terminal baud rate is the same as the VPN Router's, the terminal displays the AT command sets on the window. Simply press **Enter** several times until a serial menu session starts. It is better to use Auto Detect Mode than PPP Mode. If you use PPP mode, it can leave the VPN Router in a state that you can never manage it from the serial interface menu directly. If this happens, you can still manage the VPN Router through a PPP application (such as Dial-Up Networking). Directly connecting a serial cable and running Hyper Terminal does not work because the interface only recognizes PPP.

3. Select one of the following **Baud Rates** to match the baud rate of your terminal. After you select the baud rate, you must click **Reset** to change the port to the selected baud rate. This option is necessary for PPP if a modem initialization string specifies a fixed baud rate.

   - 57600
   - 38400
   - 19200
   - 9600 (default)

4. Enter the **modem initialization** string. See the manufacturer's documentation to learn the vendor-specific character initialization string. Preconfiguring the modem and using the VPN Router's default initialization string (ATZ) provides the best results.

   A sample 3Com/US Robotics 56K modem initialization string that instructs the external modem to connect at 19,200 Kb/s is ATZAT&B1AT&N10.

5. Click **Reset** to reset the port to the selected baud rate and apply any other modem changes.

Dialing in to the VPN Router

Use the standard dial-up networking procedure to connect to the VPN Router. After connecting, you can then manage the VPN Router using either Telnet (for the command line interface) or the browser-based GUI. Use the VPN Router's management IP address for the Telnet session or the browser's destination URL.

Troubleshooting Serial PPP

When the serial port is set up for PPP only, you can still do inband Web management.

Cause:

I have a modem connected, but I cannot get a PPP connection.

Actions:

- Verify that the modem supports the VPN Router's selected baud rate. Most connection problems occur because the modem is not operating at the same baud rate as the VPN Router. For example, a 3Com/US Robotics 56 Kb/s modem's default baud rate when attempting to establish a connection to the VPN Router is 38400, but the VPN Router's default baud rate is 9600.
- Verify that the VPN Router is set up for PPP over the serial port. You can verify this by checking the settings in the Web interface (System > Settings).
- Verify that you clicked **Reset** from the Web interface when making changes to the window (System > System Settings). This guarantees the serial port resets and initializes the modem. This is especially true with a modem connected to a VPN Router that was restarted.
- Check the event log for failures.
- Make sure you have the correct dial-up networking settings. See the section, "Setting up a Dial-Up Networking connection."
- Make sure you have the remote modem set to auto answer and that it is in smart mode so that it can respond to the AT command set.
- Verify that the auto detection did not fail, and that the VPN Router is in serial menu mode.

Cause:

You were dialed in and managing the VPN Router remotely using PPP and you changed the baud rate and applied it, but now you cannot manage the VPN Router.

Action:

To manage the VPN Router, disconnect the dial-up connection and try to re-establish it. This gives the modem a chance to renegotiate the baud rate with the VPN Router.

Cause:

You are set up to use PPP but want to use the serial port for the serial menu.

Action:

Choose the serial port mode **Serial Menu**. Press **OK** using the Web management interface (System > System Settings) and restart the VPN Router. To use the Serial Menu, you must install a serial cable in place of the modem. Remember to power off the VPN Router when plugging in and unplugging the serial port connection; otherwise, you can damage system components.

Cause:

You are set up to use the Serial Menu but want to use the port for PPP.

Action:

You can change the serial port settings (System > System Settings) or the Serial Menu itself. For these changes to take effect, restart the VPN Router. For the best results, connect the modem while the VPN Router is turned off.

Cause:

You are using a dial-up serial PPP connection and you encounter repeated CRC errors.

Action:

Make sure that the modem that is connected to the VPN Router has hardware flow control enabled.

PPP option settings

The following settings describe the VPN Router's behavior when negotiating serial PPP.

For IP:

- IP Address negotiation is enabled.
- The VPN Router needs the peer's IP address to make a connection.
- The peer should not suggest an IP address for the VPN Router. The VPN Router uses its management IP address.
- The VPN Router rejects VJ compression.
- The VPN Router rejects VJ connection ID compression.

For LCP:

- The VPN Router does not initiate a connection.
- The VPN Router accepts magic number negotiation.
- The VPN Router rejects address control field compression.
- The VPN Router rejects protocol field compression.
- The VPN Router does not allow asynchronous character map to be negotiated.
- The VPN Router accepts Maximum Receive Unit (MRU) requests.

For authentication:

- The VPN Router does not authenticate itself to a peer with PAP upon request.
- The VPN Router requires that peers perform PAP authentication using the administrator's login and password.
- The VPN Router does not authenticate itself to a peer with the Challenge Handshake Authentication Protocol (CHAP) upon request.
- The VPN Router does not require that the peer authenticate itself with CHAP.

Appendix C
System messages

System forwarding (syslog) uses the system logging daemon (syslogd) to forward information from the VPN Router system log to different host machines.

This appendix provides a listing of possible syslog messages that the VPN Router can write to a remote system. A description and the recommended corrective action, if any, follows each message.

Certificate messages

Error removing CA certificate file: xxx

Description: The VPN Router is manufactured with a trusted certificate authority (CA) certificate for use by SSL. The temporary manufacturing file containing the certificate is removed the first time you boot the VPN Router. This error message indicates that the VPN Router cannot remove the temporary certificate file. A general problem with the local file system can cause this error.

Action: Manually delete all files in the /system/cert/ca directory.

Installed new CA certificate from file: *xxx*

Description: The VPN Router is manufactured with trusted CA certificates for use by SSL. This informational message indicates a trusted SSL CA certificate was installed when the VPN Router was manufactured.

Action: No action required.

tCert: Shutdown complete

Description: This informational message indicates that the task responsible for certificate maintenance is shut down. This is usually part of the normal system shutdown.

Action: No action required.

tCert: task creation failed

Description: The task responsible for X.509 certificate maintenance on the VPN Router failed to start properly. This most likely indicates severe resource exhaustion on the VPN Router.

Action: Reboot the VPN Router. If the reboot does not fix the problem, contact Nortel Technical Support.

tCert: X.509 certificates disabled in flash memory

Description: This is an informational message that indicates the use of X.509 certificates by the VPN Router is totally disabled.

Action: No action required.

Warning: System CA certificates may have been tampered with, please reinstall!

Description: The VPN Router performs a periodic integrity check of the SSL-related X.509 certificates that are stored on the VPN Router's local file system. This message signals a failure during the integrity check. This indicates that one or more of the SSL-related certificates were tampered with, or that a certificate is corrupted.

Action:

1 Delete, then reinstall any SSL-related certificates. You do not need to delete and reinstall the tunnel-related certificates since they are stored in the LDAP database stores them and not in the local file system.

2 Manually verify the tunnel-related certificate fingerprints. Perform this procedure any time you suspect tampering.

ISAKMP messages

ISAKMP [13] No proposal chosen in message from *xxx* (a.b.c.d)

In many cases, a Session:IPsec message precedes the ISAKMP message. If the Session:IPsec message indicates an error, then the Session message describes the cause and required action. If there is no Session:IPsec error message, see the following list of causes and solutions for explanations.

Description: The encryption types proposed by branch office *xxx* do not match the encryption types configured locally.

Action: Check the encryption types on both sides to make sure they match. If necessary, reconfigure the encryption on one system.

Description: The requested authentication method (for example, RSA* Digital Signature) is not enabled.

Action: Enable all required authentication types. Make sure the unneeded types are disabled.

Description: One side of the connection is configured to support dynamic routing while the other side is configured for static routing, where branch office is *xxx*.

Action: Configure both sides to use the same routing type.

Description: Both sides are configured to support static routing. However, the local and remote network definitions of the two sides do not match, where branch office is *xxx*.

Action: Configure both sides to have matching local and remote network definitions.

Description: The Perfect Forward Secrecy (PFS) setting of the two sides do not match. Branch office *xxx* does not have PFS enabled, while PFS is required by the local settings.

Action: Make sure the PFS settings on both sides match. Either enable PFS on the remote side, or disable PFS locally.

ISAKMP [13] Error notification (No proposal chosen) received from *xxx* (a.b.c.d)

Description: The proposal made by the local VPN Router is rejected by a VPN Client. This usually indicates that the client is using an international version (56-bit) while the VPN Router has stronger encryption enabled.

Action: The encryption methods used by the client and the VPN Router must match. Either provide the user with a VPN Client version that supports the stronger encryption method used by the VPN Router, or enable 56-bit encryption on the VPN Router.

Description: The proposal made by the local VPN Router is rejected by a remote branch office VPN Router, or by an IPsec implementation from another vendor.

Action: Check with the administrator of the remote system to determine the cause of the problem. If the remote system is another VPN Router, the cause is noted in that system's log.

ISAKMP [13] Authentication failure in message from *xxx* (a.b.c.d)

In many cases, a Session:IPsec message precedes the ISAKMP message. If the Session:IPsec message indicates an error, the Session message describes the cause and required action. If there is no Session:IPsec error message, see the following list of causes and solutions for explanations.

Description: No encryption types are enabled for the account in question.

Action: Enable the desired encryption types.

Description: The requested authentication method (for example, RSA Digital Signature) is not enabled.

Action: Enable all required authentication types. Make sure the unneeded types are disabled.

ISAKMP [13] Error notification (Authentication failure) received from *xxx* (a.b.c.d)

Description: A VPN Client attempted to connect, but the user supplied the wrong password.

Action: Make sure that the user and the VPN Router have the same password.

Description: A remote branch office rejected your VPN Router's attempt to authenticate.

Action: Contact the administrator of the remote system. If the remote system is a VPN Router, the cause is noted in that system log.

No response from client—logging out

Description: Your VPN Router has lost network connectivity with the remote side.

Action: Verify the network connectivity between your VPN Router and the remote side.

Description: A remote branch office using pre-shared key authentication is using a key that is different from what is configured on the local VPN Router. Because the two sides are using a different encryption key, your VPN Router cannot decrypt the encrypted messages from the other side, and therefore drops the messages.

Action: Make sure that both systems are using the same pre-shared key.

ISAKMP [13] *xxx* (a.b.c.d) has exceeded idle timeout—logging out

Description: The remote system is idle for the amount of time configured in the Idle Timeout parameter (Profiles > Groups > Connectivity).

Action: If the Idle Timeout value is too low, increase it. To disable idle timeouts entirely, set the Idle Timeout value to 00:00:00.

ISAKMP [13] Invalid ID information in message from *xxx* (a.b.c.d)

Description: One side of the connection is configured to support dynamic routing while the other side is configured for static routing. Branch office is *xxx*.

Action: Configure both sides to use the same routing type.

Description: Both sides are configured to support static routing, however the local and remote network definitions of the two sides do not match. Branch office is *xxx*.

Action: Configure both sides to have matching local and remote network definitions.

ISAKMP [13] Error notification (Invalid ID information) received from *xxx* (a.b.c.d)

Description: One side of the connection is configured to support dynamic routing while the other side is configured for static routing. Branch office is *xxx*.

Action: Configure both sides to use the same routing type.

Description: Both sides are configured to support static routing. However, the local and remote network definitions of the two sides do not match. Branch office is *xxx*.

Action: Configure both sides to have matching local and remote network definitions.

Branch office messages

Couldn't install route for *remxxx@xxx*

Description: The VPN Router cannot install the route for the remote network (indicated by *remxxx@xxx)*. This happens when the route collides with an existing static route.

Action: Remove the existing static route or change the route for the remote network to be a subset or superset of the static route.

SSL messages

Checking chain: invalid parent cert, *xxx*

Description: The given certificate in the chain is not valid. This indicates that the certificate installed at the external LDAP server is expired or is invalid in some other way.

Action: Verify that the certificate is valid or use a certificate that you know is valid.

Checking chain: invalid child cert, *xxx*

Description: The given certificate in the chain is not valid. This might indicate that the certificate installed at the external LDAP server has expired or is invalid in some other way.

Action: Verify that the certificate is valid or use a certificate that you know is valid.

Child cert *[xxx]* not valid signature by *[xxx]* - *xxx*

Description: The given certificate in the chain is not properly signed. This error indicates that the certificate was incorrectly installed at the external LDAP server.

Action: Reinstall the certificate at the external LDAP server.

Invalid root cert, *xxx*

Description: One of the root certificates passed to the VPN Router during SSL negotiations was invalid.

Action: Configure the remote side to pass a valid chain of certificates to the VPN Router.

No matching trusted CA certs

Description: None of the certificates in the chain are trusted CA certificates. You can receive this message if the CA certificate is not installed or is not marked as trusted on the VPN Router.

Action: Make sure the CA certificate is installed and that the certificate is marked as trusted on your VPN Router.

Database messages

Configuration file: *xxx* does not exist

Description: The slapd.cnf file does not exist on the disk, therefore the internal LDAP server cannot start. This error occurs if the VPN Router disk was modified.

Action: Reinstall the VPN Router software.

Failed to start

Description: The internal LDAP server did not start. This is caused by a missing configuration file.

Action: Reinstall the VPN Router software.

Index file for attribute *xxx* from file *xxx* could not be created

Description: The given attribute index file for the internal LDAP server was not created. This can indicate that the VPN Router disk is full or that the database index files are corrupt.

Action: Restore the VPN Router software from an FTP backup or re-import the database from the LDIF file.

LDIF file: *xxx* could not back up

Description: The internal LDAP server database cannot be backed up to the specified LDIF file. This happens if the name of the LDIF file is not in 8.3 format.

Action: Make sure the backup file has an 8.3 file name.

LDIF file: could not restore *xxx*

Description: The internal LDAP server database cannot be restored from the specified LDIF file. This indicates that the LDIF file does not exist.

Action: Choose an LDIF file that currently resides on the VPN Router disk.

Security messages

Account: *xxx[xxx]* uid *xxx* not found in account

Description: A UID of the remote entity was not found in the account used to initiate a branch office connection (the UID entry in the message is a UID for PPTP or Layer 2 Tunneling Protocol (L2TP), and a remote address for IPsec). You receive this error if the credentials given by the remote side of the branch office connection do not match the local configuration.

Action: Make sure the Remote Identity information of the IPsec Authentication Certificates section (Profiles > Branch Office > Edit Connection) is configured properly.

AuthServer: ldap inconsistent; no server type in entry *xxx*

Description: An LDAP entry for an authentication server does not contain a server type. This indicates that the LDAP server is not accessible.

Action: Start the LDAP server, or change the external LDAP server configuration to make it accessible.

CaAuthServer: failed remove - *xxx*

Description: An LDAP entry for a CA authentication server was not fully created and then cannot be removed. This happens if the LDAP server is not accessible.

Action: Start the LDAP server, or change the external LDAP server configuration to make it accessible.

CaAuthServerCollection: authenticate *xxx* cert *[xxx]* invalid signature by *[xxx]* - *xxx*

Description: The certificate passed in with the authentication request does not have a valid signature, based on the CA certificate configured on the VPN Router. This indicates either an incorrect certificate at the remote side (either a client or branch office), or an incorrect CA certificate installed on the VPN Router.

Action: Make sure that both sides have the correct certificates installed.

CaAuthServerCollection: authenticate *xxx[xxx]*:*xxx* bad certificate - *xxx*

Description: The certificate passed in with the authentication request is not a valid X.509 certificate. This error occurs if the certificate configured either at the client or the other side of the Branch Office is incorrect.

Action: Install the correct certificates.

Conn backlog reached, possible SYN attack

Description: The number of connections on a socket is reaching or has completely reached the maximum number of queued connections.

Action: The device can be under a syn attack. Notify your IS department.

Security: store new system IP address *xxx* failed—*xxx*

Description: The system IP address cannot be stored in the VPN Router configuration LDAP entry. Possible cause: the LDAP server is not accessible.

Action: Start the LDAP server or change the external LDAP server configuration to make it accessible.

Security: store new system name *xxx* failed—*xxx*

Description: The system name cannot be stored in the VPN Router configuration LDAP entry. This can indicate that the LDAP server is not accessible.

Action: Start the LDAP server, or change the external LDAP server configuration to make it accessible.

Security: store new system subnet mask *xxx* failed—*xxx*

Description: The system subnet mask cannot be stored in the VPN Router configuration LDAP entry. This can indicate that the LDAP server is not accessible.

Action: Start the LDAP server, or change the external LDAP server configuration to make it accessible.

Entry is referenced *[xxx]—xxx*

Description: The LDAP entry is being referenced by another LDAP entry (for example, a filter set being referenced by a User Group or Branch Office Connection).

Action: Remove all references to the LDAP entry in question, then delete the entry.

Error copying entry *[xxx]* to *[xxx]—xxx*

Description: An error occurred while copying an LDAP entry.

Action: Delete the new copy that caused the error and retry the rename operation.

Error copying subentries of *[xxx]* to *[xxx]—xxx*

Description: An error occurred while copying a set of LDAP entries. This is caused by an unreachable LDAP server.

Action: Start the LDAP server, or change the external LDAP server configuration to make it accessible.

Error copying tree *[xxx]* to *[xxx]—xxx*

Description: An error occurred while copying a tree of LDAP entries. This indicates that the LDAP server is not accessible.

Action: Start the LDAP server, or change the external LDAP server configuration to make it accessible.

Error deleting entry *[xxx]—xxx*

Description: An error occurred while deleting an LDAP entry. This indicates that the LDAP server is not accessible.

Action: Start the LDAP server, or change the external LDAP server configuration to make it accessible.

Error deleting tree *[xxx]—xxx*

Description: An error occurred while deleting a tree of LDAP entries. This indicates that the LDAP server is not accessible.

Action: Start the LDAP server, or change the external LDAP server configuration to make it accessible.

LocalAuthServer: failed remove—*xxx*

Description: An LDAP entry for an LDAP authentication server was not fully created and then cannot be removed. This indicates that the LDAP server is not accessible.

Action: Start the LDAP server, or change the external LDAP server configuration to make it accessible.

SchemaCls: Database schema not available

Description: The external LDAP server does not support a schema entry so it is not possible to update its schema over the network. This error occurs if the external LDAP server does not support the cn=schema entry.

Action: Update the external LDAP server schema manually, then reconnect to it.

xxx xxx being referenced by *xxx*

Description: The LDAP entry is referenced by another LDAP entry (for example, a filter set referenced by a User Group or Branch Office Connection).

Action: Remove all references to the LDAP entry in question, then delete the entry.

Session: *xxx* uid invalid—authentication failed

Description: The given IPsec hashed UID is not found in the LDAP database. This occurs if the UID typed in at the client is invalid or the account no longer exists.

Action: Make sure the correct UID was typed at the client and make sure the account is valid.

Session: *xxx[xxx]* invalid uid—authentication failed

Description: The given group UID is not found in the LDAP database, or the UID is found under a group account and this is not a group login. This error occurs if the UID is mistyped at the client or the account no longer exists.

Action: Make sure the correct UID was typed at the client and make sure the account is valid.

Session: *xxx[xxx]* session rejected—system is initializing

Description: The VPN Router rejected an incoming request because it is still initializing.

Action: Wait a short time to make sure that the VPN Router is initialized, then try again.

Session: *xxx[xxx]* session rejected—system is shutting down

Description: The VPN Router rejected an incoming request because it is shutting down.

Action: Wait for the VPN Router to restart, then try again.

Session: *xxx[xxx]:xxx xxx* auth method not allowed

Description: The authentication method of the incoming request is not allowed in the group that the session is bound to. The session is bound to a group by one of the following:

- the group that the user's account is in (in LDAP)
- RADIUS default group
- RADIUS class attribute
- CA authentication server's default group

Action: Enable the authentication method for the bound group.

Session: *xxx[xxx]:xxx*—authentication failed using all authservers

Description: The incoming request cannot be authenticated by any configured authentication servers (LDAP, RADIUS, or CA).

Action: Provide the correct credentials. For example, create a new user account.

Session: *xxx[xxx]:xxx* AddLink failed *[xxx]* current links *xxx*

Description: The multilink session cannot be created. This is caused by any of the following:

- New logins are disabled.
- The max sessions on the VPN Router is reached.
- There is not enough heap on the VPN Router.
- The call admission priority slot is full.
- The call admission priority slot is outside of access hours.
- The max links configured for the group is reached.

Action: Verify the correct settings for each of the possible causes.

Session: *xxx[xxx]:xxx* IP address assignment failed

Description: An address cannot be assigned to the session. This occurs if the static address for the session is in use or if the address pool is exhausted.

Action: Expand the number of addresses in the pool, or change the static address on the account.

Session: *xxx[xxx]:xxx* L2TP host *[xxx]* account misconfigured

Description: The L2TP Access Concentrator on the Branch Office Connection does not exist or does not have a LAC or VPN Router UID.

Action: Recreate the L2TP Access Concentrator entry and make sure this entry is linked to the Branch Office Connection.

Session: *xxx[xxx]:xxx* account has max links *(xxx)*

Description: The maximum number of multilink sessions is reached.

Action: Increase the maximum number of allowed PPP links on the Profiles > Groups > Edit > Connectivity window.

Session: *xxx[xxx]:xxx* account has max sessions *(xxx)*

Description: The maximum number of sessions for the given account has been reached.

Action: Increase the number of logins on the Profiles > Groups > Edit > Connectivity window.

Session: *xxx[xxx]:xxx* account is disabled

Description: The account is not currently enabled. This error occurs if the Branch Office Connection request is a different tunnel type than the local VPN Router.

Action: Make sure that both sides are configured to support the same tunnel type.

Session: *xxx[xxx]:xxx* account not allowed now

Description: The session request is outside the permitted hours of access.

Action: Change the Access Hours setting assigned to the group on the Profiles > Groups > Edit > Connectivity window.

Session: *xxx[xxx]:xxx* authentication failed using *xxx*

Description: The credentials for the session cannot be validated by any of the authentication servers.

Action:

1. Make sure you are using the correct credentials.
2. Expand the capability of the RADIUS authentication server to handle the authentication method.
3. Add a new account with the given credentials.

Session: *xxx[xxx]:xxx* client assigned address *[xxx]* already in use

Description: The address given by the tunnel client is currently is use. This indicates that the address is either being used in a static or dynamic route, or that the address is assigned to an active tunnel.

Action: Configure the client to use a different address.

Session: *xxx[xxx]:xxx* connect Qos level *xxx* full

Description: The VPN Router does not have any more slots for the session's call admission priority. This indicates that the configured Call Admission Priority for the group that the request is assigned to is too low.

Action: Increase the Call Admission Priority on the Profiles > Groups > Edit > Connectivity window.

Session: *xxx[xxx]:xxx* invalid password—master admin authentication failed

Description: The primary administrator password is invalid. This results from using the wrong password or from making a mistake while typing the password.

Action: Make sure you are using the correct password, and make sure you typed it correctly.

Session: *xxx[xxx]:xxx* login rejected - new logins disabled

Description: New logins are currently disabled. This occurs if the VPN Router is shut down with *one* of the following settings enabled on the Admin > Shutdown window:

- The **Disable new logins** checkbox is selected
- The **Disable logins after restart** checkbox is selected

Action: Deselecting the disable login settings on the Admin > Shutdown window and then restart the VPN Router.

Session: *xxx[xxx]:xxx* no memory free: *xxx* threshold: *xxx*

Description: There is not enough heap memory available to establish the session. This occurs if the VPN Router consumed a large amount of memory while processing management requests.

Action: Increase the amount of physical memory on the VPN Router, or wait until the management requests are complete.

Session: *xxx[xxx]:xxx* only one session/static address allowed

Description: Only one session can use an address. This error occurs if the VPN Router receives a second login to an account that has a static address configured.

Action: Change the account to use dynamic addresses from either a static address pool or DHCP.

Session: *xxx[xxx]:xxx* pool address *[xxx]* already in use

Description: The returned static pool address is currently is use. This error occurs if another tunnel is using this address through a static address configuration or another address pool. The error also occurs if a static host route using this address is added.

Action: No action is necessary. The VPN Router tries to allocate a different address.

Session: *xxx[xxx]:xxx* session directed to use server *xxx*

Description: This is an informational message indicating that load balancing is enabled and the session is redirected to another VPN Router. This occurs when the VPN Router is either more heavily CPU-loaded or session-loaded than the other VPN Router.

Action: No action is necessary.

Session: *xxx[xxx]:xxx* static address *[xxx]* already in use

Description: The static address assigned to the account is in use by another tunnel or through a static host route.

Action: Change the static address.

Session: *xxx[xxx]:xxx* system has max sessions *(xxx)*

Description: The VPN Router reached its maximum number of sessions. This occurs when the VPN Router reaches the maximum number of configurable tunnels.

Action: Use load balancing with another VPN Router (if you are using IPsec clients), or upgrade the VPN Router to the next higher model.

RADIUS accounting messages

RADIUS: Cannot send accounting request to <*server-name*>, possibly due to DNS translation failure

Description: This message indicates a connection failure. While sending a request, an error occurred due to a socket creation problem. This usually indicates a DNS resolution problem.

Action: Verify the following:

- DNS host name is correct
- DNS server is configured properly
- DNS server is available

RADIUS: no reply from server <*server-name*>(<*port number*>)

Description: This message indicates a connection failure. The connection timed out while waiting for a response.

Action: Verify the following:

- RADIUS server's IP address and port number are correct
- RADIUS server is available
- Shared secret is correct

RADIUS: <*server-name*> server timed out

Description: This message indicates a connection failure. The connection timed out while waiting for a response.

Action: Verify the following:

- RADIUS server's IP address and port number are correct
- RADIUS server is available
- Shared secret is correct

RADIUS: network socket failure with <*server-name*>, recvfrom error: <*error*>

Description: This message indicates a connection failure. An error occurred while receiving the response.

Action: Retry authentication attempt and verify that RADIUS server packets are properly formed.

RADIUS: <*server-name*> server failed

Description: This message indicates a connection failure. An error occurred while receiving the response.

Action: Retry authentication attempt and verify that RADIUS server packets are properly formed.

Indicated packet length too large

Description: This message indicates that an invalid response was received. The length of the response packet is not equal to the number of bytes received.

Action: Retry authentication attempt and verify that RADIUS server packets are properly formed.

RADIUS: failure sending <*user-name*> accounting record to <*server-name*>

Description: This message indicates that an invalid response was received. The length of the response packet is not equal to the number of bytes received.

Action: Retry authentication attempt and verify that RADIUS server packets are properly formed.

Non-matching ID in server response

Description: This message indicates that an invalid response was received. The Transaction ID in the response packet is not the expected value.

Action: Retry authentication attempt and verify that RADIUS server packets are properly formed.

Unsupported response type (<*number*>) received from server

Description: This message indicates that an invalid response was received. The response packet type is not one of the expected types: Access-Accept, Access-Reject, or Access-Challenge.

Action: Retry authentication attempt and verify that RADIUS server packets are properly formed.

Received bad attribute type from server

Description: This message indicates that an invalid response was received. The RADIUS Attribute value is incorrect.

Action: Retry authentication attempt and verify that RADIUS server packets are properly formed.

Response OK

Description: This message indicates that a valid response was received.

Action: No action necessary.

RADIUS: <*user-name*> accounting record sent to <*server-name*> OK

Description: This message indicates that a valid response was received.

Action: No action necessary.

RADIUS authentication messages

RADIUS: Cannot send request to <*server-name*>, possibly due to DNS translation failure

Description: This message indicates a connection failure. While sending a request, an error occurred due to a socket creation problem. This usually indicates a DNS resolution problem.

Action: Verify the following:

- DNS host name is correct
- DNS server is configured properly
- DNS server is available

Login failure due to: Server network connection failure

Description: This message is received by the VPN Client, and indicates a connection failure. While sending a request, an error occurred due to a socket creation problem. This usually indicates a DNS resolution problem.

Action: Verify the following:

- DNS host name is correct
- DNS server is configured properly
- DNS server is available

RADIUS: no reply from RADIUS server <*server-name*>(<*port number*>)

Description: This message indicates a connection failure. The connection timed out while waiting for a response.

Action: Verify the following:

- RADIUS server's IP address and port number are correct
- RADIUS server is available
- Shared secret is correct

RADIUS: <*server-name*> server timed out authenticating <*user-name*>

Description: This message indicates a connection failure. The connection timed out while waiting for a response.

Action: Verify the following:

- RADIUS server's IP address and port number are correct
- RADIUS server is available
- Shared secret is correct

RADIUS: network socket failure with <*server-name*>, recvfrom error: <*error*>

Description: This message indicates a connection failure. An error occurred while receiving the response.

Action: Retry authentication attempt and verify that RADIUS server packets are properly formed.

RADIUS: <*server-name*> server error while authenticating <*user-name*>

Description: This message indicates a connection failure. An error occurred while receiving the response.

Action: Retry authentication attempt and verify that RADIUS server packets are properly formed.

Indicated packet length too large

Description: This message indicates that an invalid response was received. The length of the response packet is not equal to the number of bytes received.

Action: Retry authentication attempt and verify that RADIUS server packets are properly formed.

RADIUS: <*server-name*> sent invalid response packet for <*user-name*>

Description: This message indicates that an invalid response was received. The length of the response packet is not equal to the number of bytes received.

Action: Retry authentication attempt and verify that RADIUS server packets are properly formed.

Non-matching id in server response

Description: This message indicates that an invalid response was received. The Transaction ID in the response packet is not the expected value.

Action: Retry authentication attempt and verify that RADIUS server packets are properly formed.

Unsupported response type (<*number*>) received from server

Description: This message indicates that an invalid response was received. The response packet type is not one of the expected types: Access-Accept, Access-Reject, or Access-Challenge.

Action: Retry authentication attempt and verify that RADIUS server packets are properly formed.

Received bad attribute type from server

Description: This message indicates that an invalid response was received. The RADIUS Attribute value is incorrect.

Action: Retry authentication attempt and verify that RADIUS server packets are properly formed.

Invalid reply digest from server, possible shared secret mismatch

Description: This message indicates that an invalid response was received. The computed authenticator does not match the value in the packet.

Action: Verify that the shared secrets match.

RADIUS: <*server-name*> sent packet with invalid response authenticator for <*user-name*>

Description: This message indicates that an invalid response was received. The computed authenticator does not match the value in the packet.

Action: Verify that the shared secrets match.

RADIUS server returned access challenge

Description: This message indicates that a valid access-challenge response was received.

Action: No action required.

RADIUS: <*server-name*> sent challenge for <*user-name*>

A valid access-challenge response was received.

Action: No action required.

RADIUS access challenge received

Description: This message is received by the VPN Client. A valid access-challenge response was received.

Action: No action required.

RADIUS server rejected access

Description: This message indicates that a valid access-reject response was received.

Action: No action required.

RADIUS: <*user-name*> access DENIED by server <*server-name*>

Description: This message indicates that a valid access-reject response was received.

Action: No action required.

Response OK

Description: This message indicates that a valid access-accept response was received.

Action: No action required.

RADIUS: <*user-name*> access OK by server <*server-name*>

Description: This message indicates that a valid access-accept response was received.

Action: No action required.

Routing messages

Unable to create *xxx* for OSPF

Description: The VPN Router cannot create the necessary components to initialize OSPF. This happens if the VPN Router runs out of free memory.

Action: Disable and enable OSPF globally in Routing > OSPF window. If this does not work, disable OSPF, boot the VPN Router and enable OSPF in Routing > OSPF window.

OSPF Disabled

Description: The administrator disabled OSPF from the Routing > OSPF window.

Action: No action required.

Closing OSPF-RTM connection

Description: OSPF closed the RTM connection, which occurs if the administrator disables OSPF from Routing > OSPF window.

Action: No action required.

Ospf_Global.State changed from ENABLED to DISABLED by user 'admin' @ *x.x.x.x*

Description: The administrator disabled OSPF from the Routing > OSPF window.

Action: No action required.

Opened OSPF-RTM connection

Description: The administrator enabled OSPF from the Routing > OSPF window and successfully registered with RTM.

Action: No action required.

OSPF Enabled

Description: The administrator enabled OSPF from the Routing > OSPF window.

Action: No action required.

Ospf_Global.State changed from DISABLED to Enabled by user 'admin' @ *x.x.x.x*

Description: The administrator disabled OSPF from the Routing > OSPF window.

Action: No action required.

Can not accept x.x.x.x as router id

Description: OSPF can not accept the given router ID in the Routing > OSPF window.

Action: You must change router ID in the Routing > OSPF window. Invalid router IDs are 127.0.0.1 and 0.0.0.0.

LoadOspfAreas Failed

Description: OSPF failed to load all areas of information from the config file. This happens if the config file is damaged.

Action: Delete all OSPF areas, recreate them from the Routing > OSPF window, and reboot the VPN Router.

LoadOspfIntf Failed

Description: OSPF failed to load information for all interfaces from the config file. This happens if the config file is damaged.

Action: Delete all OSPF interfaces, re-create them from the Routing > Interface window, and reboot the VPN Router.

VR *xxx*: Starting *xxx* as Master for *xxx*

Description: Logged when VRRP is starting as a master for an address. The parameters are:

- The VRID of this VR
- The reason for starting, either because it was enabled or the interface went up
- The IP address

Action: No action required.

VR *xxx*: Starting *xxx* as Backup for *xxx*

Description: Logged when starting as a backup for an address. The parameters are:

- The VRID of this VR
- The reason for starting, either because it was enabled or the interface went up
- The IP address

Action: No action required.

VR *xxx*: Starting *xxx* as master delayed Backup for *xxx*

Description: Logged when master delay mode is in effect. The parameters are:

- The VRID of this VR
- The reason for starting, either because it was enabled or the interface came up
- The IP address

Action: No action required.

VR *xxx*: Shutting down *xxx* on *xxx*

Description: Logged when VRRP is stopping. The parameters are:

- The VRID of this VR
- The reason for stopping, either because it was disabled or the circuit went down
- The IP address

Action: No action required.

Unable to get configuration for VR *xxx*

Description: This is an error event that is logged when VRRP is enabled but the common configuration parameters are missing. These are the items set in the Routing > VRRP window.

Action: No action required.

RIP *xxx*: RIP Enabled

Description: Logged when RIP is globally enabled.

Action: No action required.

RIP *xxx*: RIP Disabled

Description: Logged when RIP is globally disabled.

Action: No action required.

RIP *xxx*: Can't alloc main node

Description: Logged when there is not enough memory to allocate RIP parameters.

Action: No action required.

RIP *xxx*: Circuit *xxx* created

Description: Logged when the RIP circuit is created. The parameter stands for circuit ID.

Action: No action required.

RIP *xxx*: Circuit *xxx* deleted

Description: Logged when the RIP circuit is deleted. The parameter stands for circuit ID.

Action: No action required.

RIP *xxx*: Unable to register with UDP

Description: Logged when you cannot register with UDP protocol.

Action: No action required.

RIP *xxx*: setsockopt RIP socket *xxx* SO_RCVBUF *xxx* failed

Description: Logged when RIP receive buffers are not large enough. This happens when a large numbers of RIP neighbors send their RIP updates simultaneously. The first parameter is the socket number and the second parameter is the maximum receive buffer size.

Action: No action required.

RIP *xxx*: bind RIP socket *xxx* failed

Description: Logged when RIP fails to bind the socket.

Action: No action required.

RIP *xxx*: Unable to spawn Dispatcher task *xxx* for RIP

Description: Logged when RIP fails to spawn the main task responsible for receiving RIP packets. The parameter stands for the name of the task.

Action: No action required.

RIP *xxx*: Unable to spawn timer task *xxx* for RIP

Description: Logged when RIP fails to spawn the timer task. The parameter stands for the name of the task.

Action: No action required.

RIP *xxx*: cid xxx mismatched auth password from *xxx*

Description: Logged when RIP authentication fails while receiving RIP packets. The first parameter is the circuit ID on which it was receiving RIP packets and the second parameter is the IP address from which it received RIP packets.

Action: No action required.

Hardware messages

The VPN Router software provides informational messages when cards are removed and replaced. When you exchange two cards with each other, the VPN Router considers this two simultaneous replacements.

Interface [*nnn*] not present, deleting from config

Description: This indicates that the configuration file contains an interface [*nnn*] entry, but there is no card in the slot. The interface [*nnn*] entry is deleted from the configuration.

Action: No action required.

Interface [*nnn*] replaced, resetting config

Description: This indicates the card type specified in the configuration file does not match the card type currently in the slot. The configuration information is reset to defaults then initialized with the current hardware.

Action: No action required.

Interface [*nnn*] replaced, deleting from config

Description: This indicates the card type specified in the configuration file does not match the card currently in the slot. The interface is deleted from the configuration. This applies when the replaced card has more ports than the current card.

Action: No action required.

HWAccel [*nnn*] not present, deleting from config

Description: This indicates the configuration file contains a HWAccel [*nnn*] entry, but there is no hardware accelerator in the slot. The HWAccel [*nnn*] entry is deleted from the configuration.

Action: No action required.

Appendix D
Configuring for interoperability

This chapter explains the requirements and procedures for setting up different vendor hardware or software to interoperate with the VPN Router. You can use these instructions to establish encrypted tunnels to and from the VPN Router with the noted vendors. These requirements and procedures are subject to change based on hardware and software changes by the vendors.

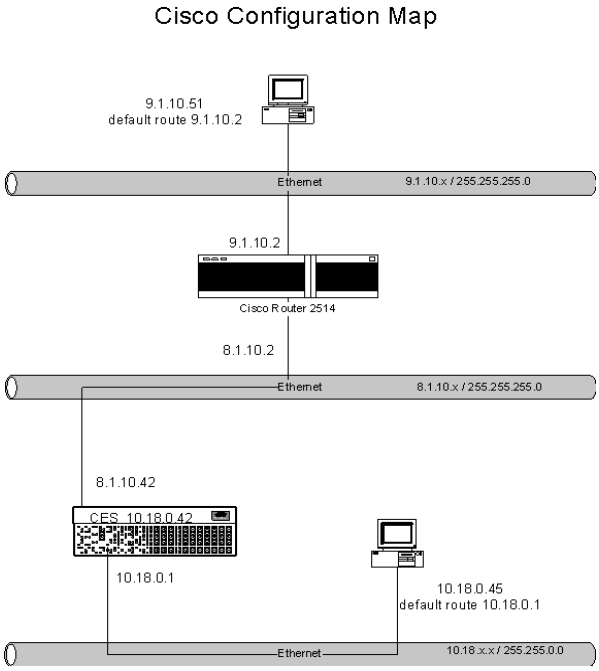
Procedures are available for the following products:

- Cisco* 2514 router, Version 11.3
- SafeNet, Inc. (IRE), SafeNet*/Soft-PK Security Policy Database Editor, Version 1.0
- Third-party clients
- Internetwork Packet Exchange (IPX)

Configuring the Cisco 2514 router, Version 11.3

To set up the VPN Router to establish encrypted tunnel connections with the Cisco 2514 router, as shown in Figure 11, configure the Cisco 2514 with the Show Configuration command.

Figure 11 VPN Router and Cisco 2514 network topology



The following is a `show config` command:

```
Cisco2514# show config
Using 1088 out of 32762 bytes
version 11.3
no service password-encryption
hostname Cisco2514
enable secret 5 $1$aSJB$Xz/o4I4IqCY.FT2RH372/1
enable password password
!
crypto isakmp policy 1
 hash md5
 authentication pre-share
 lifetime 3000
crypto isakmp key test address 8.1.10.42
!
crypto ipsec transform-set esp1 esp-des esp-md5-hmac
!
crypto map bay 11 ipsec-isakmp
 set peer 8.1.10.42
 set session-key lifetime seconds 3000
 set transform-set esp1
 match address 132
!
!
interface Ethernet0
 ip address 9.1.10.2 255.255.255.0
 no mop enabled
!
interface Ethernet1
 ip address 8.1.10.2 255.255.255.0
 no mop enabled
 crypto map bay
!
interface Serial0
 no ip address
 no ip mroute-cache
 shutdown
!
interface Serial1
 no ip address
 shutdown
!
ip classless
ip route 10.18.0.45 255.255.255.255 8.1.10.42
access-list 132 permit ip host 9.1.10.51 host 10.18.0.45
access-list 132 permit ip host 10.18.0.45 host 9.1.10.51
dialer-list 1 protocol ip permit
```

```
dialer-list 1 protocol ipx permit
snmp-server community public RO
line con 0
line aux 0
line vty 0 4
password terminal
login
end
```

Configuring the VPN Router for Cisco interoperability

To configure the VPN Router for Cisco interoperability:

1. Select to **Profiles** > **Networks** and click **Edit**.
2. Create any local accessible networks that you want available.
3. Enter the IP address for the new subnet; for example, 10.18.0.45.
4. Enter the subnet mask for the new network.
5. Click **Add**.

   The Networks Edit window appears and shows the newly created subnet in the Current Subnets list for the named network.

6. Add each local subnet to a **Network** profile for which you want tunneled connections coming to or going from the .
7. On the **Profiles** > **Branch Office: Edit GROUP** window, verify that your settings are synchronized with the Cisco router .

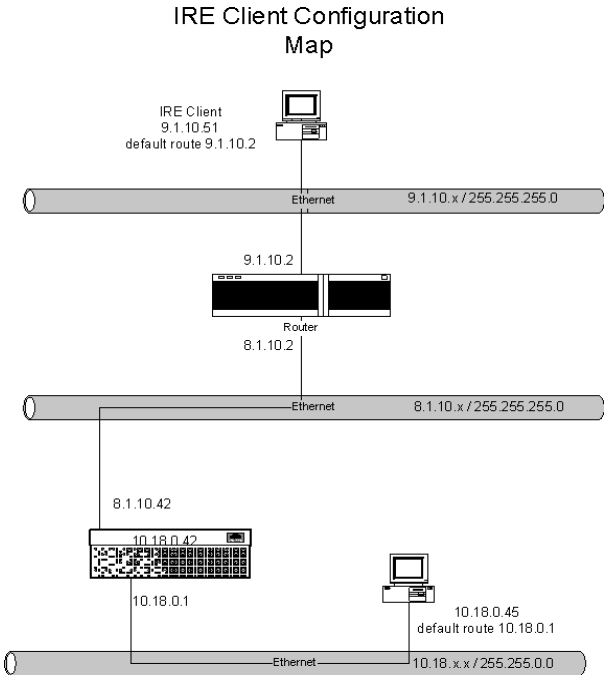
   For Cisco, to turn off **Vendor ID** and **Perfect Forward Secrecy (PFS)**, go to the **Profiles** > **Groups** > **IPsec: Configure** window.

8. Create and configure the IPsec branch office connection on the VPN Router, using the network profile you just created for the local accessible network.
9. On the **Profiles** > **Branch Office** window, enable **IPsec Authentication: Text Pre-Shared Key**.

Configuring the SafeNet/Soft-PK Security Policy Database Editor, Version 1.0s

To set up the VPN Router to establish encrypted tunnel connections with the IRE Soft-PK Security Policy Client as illustrated in Figure 12, configure the windows as described on following pages.

Figure 12 VPN Router and IRE SafeNet network topology

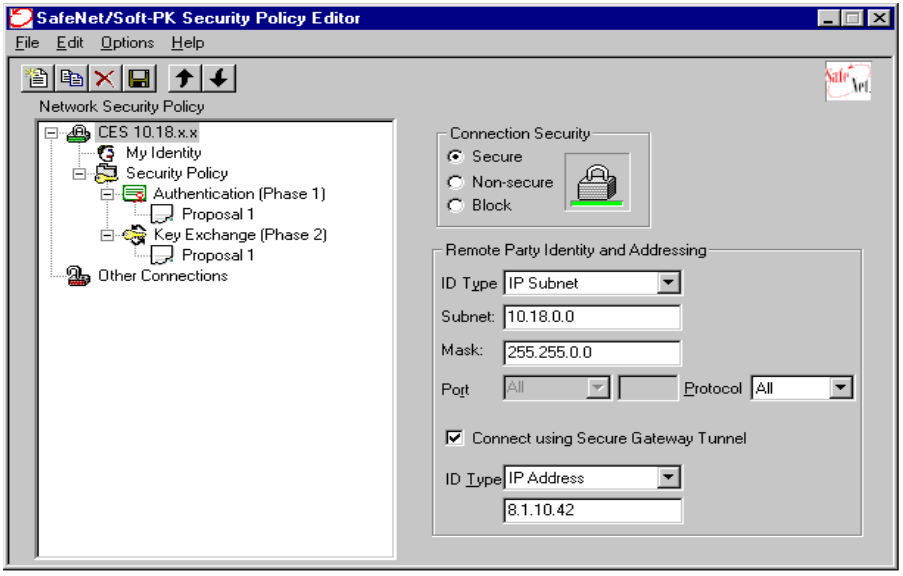


Connecting to IRE SafeNET/Soft-PK Security Policy Client

To set up the VPN Router to establish encrypted tunnel connections with the IRE SafeNet/Soft-PK Security Policy Client, do the following:

1 Open the SafeNet/Soft-PK Security Policy Client, and click **File: New**.

The following window configures the network so that any packets going to the 10.18.0.0 subnet goes through the VPN Router's 8.1.10.42 interface to establish a tunnel.



2 Click the switch: **CES 10.18.x.x**.

3 For **Connection Security**, click **Secure**.

4 Under **Remote Party Identity and Addressing**, select the following:

- ID Type: **IP Subnet**
- Subnet: **10.18.0.0**.
- Mask: **255.255.0.0**
- Protocol: **All**

5 Under **Connect using Secure Gateway Tunnel**, select the following:

- ID Type: **IP Address**

- **8.1.10.42**

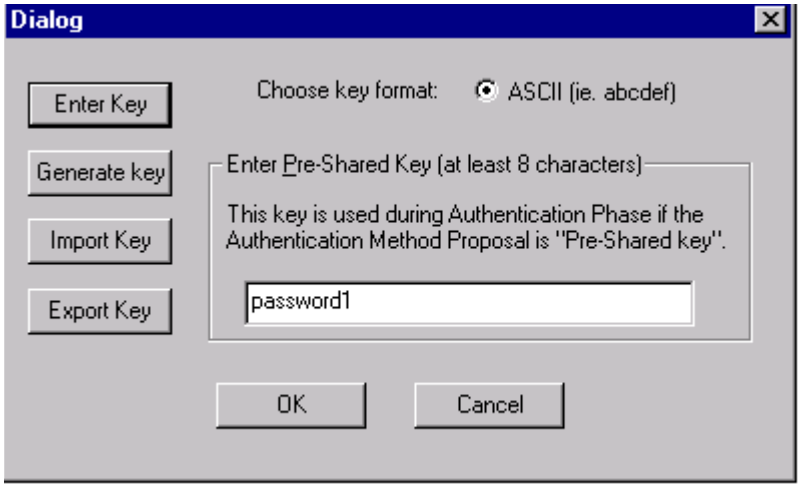
The SafeNet/Soft PX Security Policy Editor dialog box appears.

6 Click **My Identity** to configure the SafeNet client, and select the following:

- Select Certificate: **None**
- ID Type: **IP Address**
- Port: **All**

7 Click **Pre-Shared Key**.

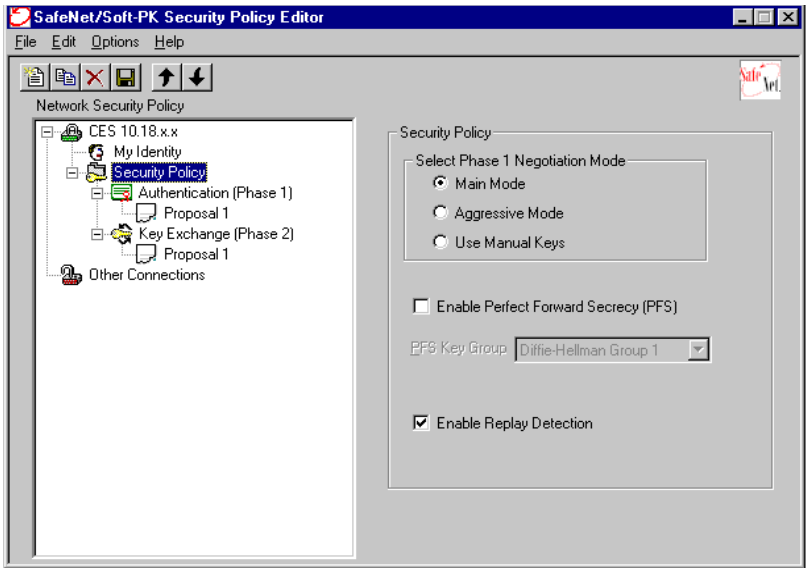
The Pre-Shared Key dialog box appears.



8 In the **Pre-Shared Key** dialog box, click **Enter Key**, then enter the preshared key.

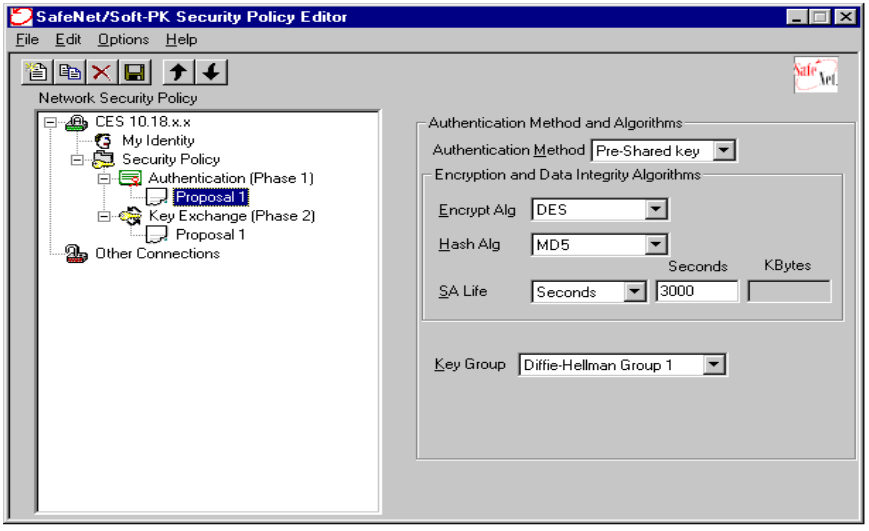
9 Click **OK**.

The SafeNet/Soft-PK Security Policy Editor dialog box appears.



10 From **Security Policy: Select Phase 1 Negotiation Mode**, click **Main Mode**.

11 Click **Enable Replay Detection**.



12 On the **Authentication (Phase 1), Proposal 1, Authentication** window, enable the following:

- Authentication Method: **Pre-Shared key**
- Encrypt Alg: **DES**
- Hash Alg: **MD5**
- SA Life: **Seconds and 3000 (Seconds)**
- Key Group: **Diffie-Hellman Group 1**

13 On the **Key Exchange (Phase 2), Proposal 1** window, enable the following:

- **Encapsulation Protocol (ESP)**
- Encrypt Alg: **DES**
- Hash Alg: **MD5**
- Encapsulation: **Tunnel**
- SA Life: **Seconds and 3000 (Seconds)**

Configuring the VPN Router for IRE interoperability

To configure the VPN Router for IRE interoperability:

1 Go to **Profiles** > **Networks** and click **Edit**.

2 Create the network object used for local accessible networks:

3 In the **Networks Edit** window, enter the IP address for the new subnet; for example, 10.18.0.45.

4 Enter the subnet mask for the new network: **255.255.0.0**.

5 Click **Add**.

The Networks Edit window reappears and shows the newly created subnet in the Current Subnets list for the named network.

6 Add each local subnet for which you want tunneled connections coming to or going from the VPN Router to a network profile.

7 On the **Profiles** > **Branch Office: Edit GROUP** window, verify that your settings are synchronized with the SafeNet client.

8 Create and configure the IPsec Branch Office connection on the VPN Router, using the network profile you just created for the local accessible network. On the **Profiles** > **Branch Office** window, enable the IPsec Authentication: **Text Pre-Shared Key** option.

9 For some vendors, if you want to turn off **Vendor ID and/or Perfect Forward Secrecy (PFS)**, do that on the **Profiles** > **Groups** > **IPsec: Configure** window.

Third-party client installation

The VPN Router supports third-party IPsec clients and includes support for the following:

- Authentication using either pre-shared authentication (using IKE Aggressive mode) or digital signature certificate authentication (using IKE Main mode) into a VPN Router's remote access user's IPsec account for third-party IPsec clients.
- Client address assignment used within the IPsec tunnel formed as a result of the Quick Mode negotiation. The client's external IP address or a pre-arranged internal IP address is used as the address that is negotiated during the IKE Quick Mode exchange.
- Split tunneling with third-party IPsec clients, such that if you enable split tunneling on the VPN Router, then the subnet that the client specifies as the VPN Router's identity within the tunnel during IKE Quick Mode must be listed as one of the split tunnel networks for the Quick Mode proposal to be accepted. If you do not enable split tunneling, then the VPN Router identity that the client specifies for Quick Mode can be any value that the client chooses.

Depending on the third-party client that you use, you must configure either a branch office tunnel or a user tunnel. For example, the VPN Router was configured and tested with the LINUX* FreeS/WAN client. If you are using the FreeS/WAN LINUX client, you must configure your user and the VPN Router as a branch office tunnel. If you are using another client that supports IPsec Aggressive mode, you can configure your VPN Router as a user tunnel.

Considerations for using third-party clients

There are several considerations regarding the use of third-party clients with VPN Router:

- Client Dynamic Addressing—Many third-party clients now support the Aggressive mode method of establishing a security association. The advantage of Aggressive mode for remote user access is that, unlike Main mode, the VPN server does not authenticate the security association based on prior knowledge of the IP address of the user. Therefore, the remote user can be dynamically assigned an address by their ISP.
- Client Address Advertisement—When connecting to the Nortel VPN client, the VPN Router assigns the client-side inner address of the IPsec tunnel from the enterprise address space. This is the address that devices on the private network send data to in response to requests from the client. The VPN Router captures packets destined for those addresses and sends them through the public interface encapsulated within IPsec, addressed to the ISP-assigned outer address of the client.

  In the case of third-party clients, the VPN Router does not have a mechanism to assign the inner address of the client. The inner address of the client tunnel is normally set the same as the ISP-assigned outer address. Servers in the enterprise need to find a route back to these clients. You must configure the VPN Router as the default VPN Router on the network. The VPN Router can then forward tunneled traffic to served clients and forward other traffic to the Internet or other default VPN Routers. This option is not always desirable because of the impact on the customer network infrastructure.
- Authentication—Various authentication services supported with the Nortel VPN Client are not supported with third-party clients. RADIUS, RSA SecurID*, and other RADIUS-based services do not work with the VPN Router, even if the third-party client has the support available. LDAP with preshared key and unmanaged certificates are the only authentication services supported by the VPN Router with third-party clients.
- Client Customization—This capability allows a service provider to customize the look of the client with their branding. In addition, it allows the service provider to preconfigure the service profiles (VPN Router destination and authentication options) and lock down the client configuration for the end-user so that they cannot modify or change these attributes.

- Load Balancing—Traditional load balancers often do not work with the IPsec protocol because of the security features on individual packets and separate key management and data channels. The VPN Router has built-in load balancing features for IPsec client terminations that allow two VPN Router to load balance and failover connections. This feature works with third-party clients.
- QoS—The Nortel VPN Client is subject to manager-defined QoS policies. You can reserve connection slots for different classes of user, and you can assign differing forwarding priorities for their traffic. The VPN Router preserves Diff-Serv markings for dial tunnels, copying the Diff-Serv Code Point from the inside packet to the tunnel header.
- Advanced attribute definition from the server—On a group-by-group basis, you can load the client with its tunneled IP address and subnet mask, a Microsoft domain name, both WINS and DNS servers, a message of the day and the VPN Router banner. The network manager can also determine access days and hours, crypto strength, how often the client rekeys, and whether the client can store a password for the group. It can initiate a password-protected screen saver if the user leaves the PC, and can log off idle connections. You can filter traffic in the tunnel based on IP address and/or port number and can configure to close the tunnel if certain network applications are run. You can set the tunnel to automatically start when predefined applications or destinations are accessed, and close when these application are completed. These features are not available with third-party clients.
- Address Assignment—Client-tunneled IP addresses are assigned through a DHCP server, on a per-group basis from a named pool, through RADIUS attribute, or statically. The client receives the inner IP address from the enterprise address space. Third-party remote access clients get their inner address assigned the same as the outer, which is normally what the ISP assigns, and is not part of the enterprise address space.
- Split Tunneling—On a group-by-group basis, a service provider determines which IP addresses go into the tunnel and which use the local adapter (for general Internet access, or local printing/server usage). With third-party clients, you should enable split tunneling. If disabled, the client must be put into a group configured to allow undefined networks.
- Advanced Security features—The Nortel VPN Client tunnel only accepts packets originating from the machine on which it is loaded. If attempts are made to route packets through a VPN Client, the tunnel is closed. When non-split tunneling is enabled, only packets that have passed through the VPN

(are correctly decrypted, and authenticated) are accepted; other packets are dropped. If any attempt is made to change the station address of the client, the tunnel is automatically closed. Third-party clients do not necessarily have this security.

- Tight integration with MS-DUN and IPASS—This allows one-click access that dials and authorizes the ISP connection and then creates the VPN connection automatically. This makes it significantly easier for the end user. Third-party clients typically do not have this ease-of-use feature.
- High end PKI integration—The VPN Router integrates software from the leading certificate vendors, for a high-end managed PKI implementation. Managed PKI features like automated enrollment and automatic renewal are critical for large-scale rollouts. Other clients have loose or no integration for managed PKI and rely on the features of a browser or simple cut-and-paste methods. This is not available with third-party clients when used with the VPN Router, even if the client has the support built in.

Configuring the VPN Router as a branch office tunnel

To configure the VPN Router as a branch office tunnel:

1. Select **Profiles** > **Branch Office** and click **Define Branch Office Connection**.

   The Branch Office > Define Connection window appears.

2. For the local endpoint address, select the address of the local VPN Router from the list.
3. For the remote endpoint address, enter the address of the remote VPN Router that forms the opposite end of the branch office connection.
4. Set the tunnel type to **IPsec**.
5. Depending on what your third-party clients support, you can use either pre-shared key or digital certificate authentication. Click to enable the user name and password to authenticate user identity. The user name is the user's IP address and the password can be any password. Match the preshared secret with the client shared secret.
6. Click **RSA Digital Signature** to enable certificate authentication if your third-party client supports RSA Digital Signature authentication. You must

then select a default server certificate from the list. You configure servers from the System > Certificates window.

7 Select **Profiles** > **Branch Office**, click **Edit**, scroll down to the IPsec section and click **Configure**.

The Branch Office window appears.

8 Select the encryption type supported by your third-party client.

9 Select **Enable** or **Disable** for the VendorID.

10 Set **Perfect Forward Secrecy (PFS)** to match the client side.

11 In the **Rekey Time-out** section, enter the amount of time you want to limit the lifetime of a single key used to encrypt data. The default is 08:00:00 (8 hours).

12 In the **Rekey Data Count** section, you can choose to set a rekey data count depending on how much data you expect to transmit through the tunnel with a single key. The default is 0 KB; a setting of 0 disables this count.

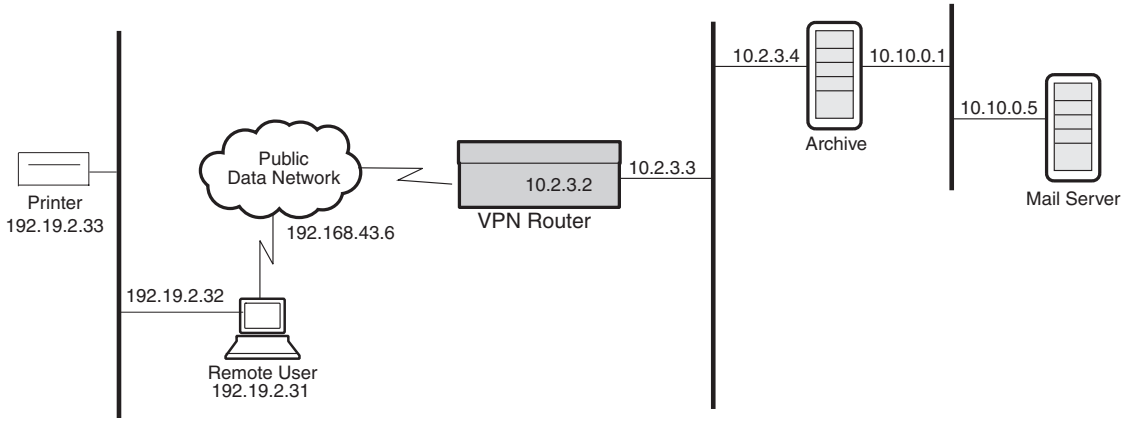
Configuring the VPN Router as a user tunnel

If you have third-party client software that supports Aggressive mode IPsec, you can configure the VPN Router as a user tunnel. You must use either the LDAP database or the certificate authentication. The VPN Router supports both preshared key and RSA digital signature authentication methods and you must specify one of these methods.

Nortel recommends enabling split tunnels for all groups that support third-party clients. If you disable split tunneling, third-party clients can connect only if you configure the group to allow undefined networks. This means that the client can establish IPsec security associations for all networks. If you do not enable split tunneling, you must enable the Allow undefined networks option.

Figure 13 shows a network with a split tunneling environment.

Figure 13 Split tunneling example



To configure the VPN Router as a user tunnel:

1. Select **Profiles** > **Groups** and click **Add**. Enter a group name of up to 64 characters (spaces are permitted); for example, Research and Development.
2. Click **Edit** next to the name of the new group, scroll down to the IPsec section, and click **Configure**.

   The IPsec Edit window appears.

3. Enable **Split tunneling** if you want your VPN Router to control the networks that the third-party client can access. If you disable split tunneling and enable Allow undefined networks for non-Nortel VPN Clients, the clients can connect to all internal networks. If you select both Split Tunneling and Allow undefined networks for non-Nortel VPN Clients, the VPN Router uses the split tunneling feature and ignores the Allow undefined networks selection.
4. Under **Client Selection**, select **Non-Nortel VPN Clients (LINUX)** or **Both Nortel and Non-Nortel VPN Clients** from the list.
5. Third-party clients can use either preshared key or digital certificate authentication. Click to enable the user name and password to authenticate user identity. If you are using Main mode, the user name is the user's IP address and the password can be any password.

   Click **RSA Digital Signature** to enable certificate authentication if your client supports this. You must then select a default server certificate from the list. You configure servers from the System > Certificates window.

6 Selections in the **Encryption** fields are dependent on the type of encryption that your third-party client supports.

7 Enable **Perfect Forward Secrecy (PFS)**. PFS ensures that if one key is compromised, subsequent keys are not compromised.

8 In the **Forced Logoff** dialog box, specify a time after which all active users are automatically logged off. The default is 0, which means the option is turned off. The possible range is 00:00:01 to 23:59:59.

9 Enable **compression** for IPsec tunneling.

10 In the **Rekey Time-out** section, enter the time you want to limit the lifetime of a single key used to encrypt data. The default is 08:00:00 (8 hours).

11 In the **Rekey Data Count** section, you can choose to set a rekey data count depending on how much data you expect to transmit through the tunnel with a single key. The default is 0 KB; a setting of 0 disables this count.

12 Enable or disable **IPsec Data Protection**, depending on whether you want to allow it.

Configuring IPX

The Internetwork Packet Exchange (IPX) protocol is the Novell* adaptation of the Xerox Networking System (XNS) protocol. IPX has the following characteristics:

- It is a connectionless datagram delivery protocol. A datagram is a unit of data that contains all of the addressing information to deliver it to its destination.
- It does not guarantee the delivery of packets. Higher-level protocols assume the responsibility for reliability.

The VPN Router supports IPX by encapsulating IPX traffic within PPTP client connections. Note that the VPN Router's IPX support is not available for the IPsec tunneling protocol.

IPX is the network-layer routing protocol used in the Novell NetWare* environment. The primary tasks of IPX are addressing, routing, and switching information packets from one location to another on a network. In a LAN-based client, the network interface card (NIC) provides network node addressing; in a tunneled environment, the VPN Router provides the network node addressing.

Network addresses form the basis of the IPX internetwork addressing scheme for sending packets between network segments. Every network segment of an internetwork is assigned a unique network address by which routers forward packets to their final destination network. On the VPN Router, all public interfaces are treated as a single network segment with a unique network address. A network address in the NetWare environment consists of eight hexadecimal characters. In the example 0x*nnnnnnnn*, 0x indicates that this is a hexadecimal number, and *n* is any hexadecimal character.

Socket numbers are the basis for an IPX *intranode address* (the address of an individual entity within a node). They allow a process (for example, IPX Routing Information Protocol [RIP] and Service Access Points [SAP]) to distinguish itself to IPX. To communicate on the network, the process must request a socket number. Any packets IPX receives addressed to that socket are then passed on to the process within the node.

The VPN Router uses IPX RIP and SAP to dynamically learn and advertise IPX routes and services. The VPN Router assigns IPX addresses to tunneled clients; remote users cannot configure the IPX tunnel address for their systems.

The VPN Router does not forward IPX packets from a private nontunneled LAN to another private nontunneled LAN, nor does it propagate routing or server tables from a private nontunneled LAN to another private nontunneled LAN.

IPX client

On the PPTP client (for example, Microsoft Dial-Up Networking), you must enable the dial-up networking IPX option. When you enable IPX, you can tunnel using IPX, IP, or IPX and IP according to the dial-up networking selections.

Windows 95 and Windows 98

When running Windows 95 or Windows 98, load the intraNetWare* client, which is available from the Novell Web site:

```
http://www.novell.com
```

Note: The NetWare client for Windows 95 and Windows 98 does not function properly; therefore, you must use the Novell intraNetWare client when using IPX with PPTP.

Windows NT

You can use either the NetWare client that is already on Windows NT systems or the Novell intraNetWare client, which you access from the Novell Web site at www.novell.com.

IPX group configuration

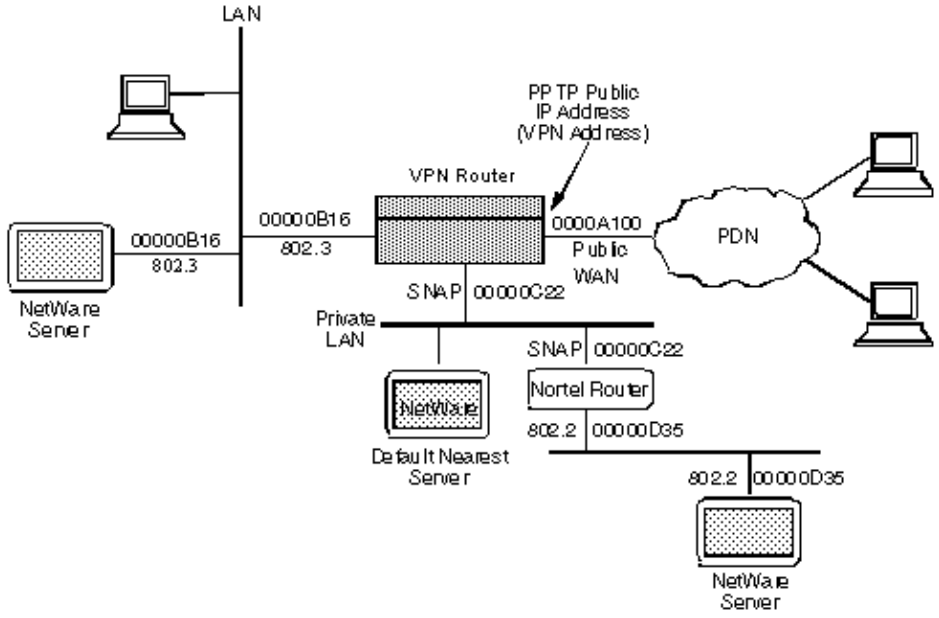
IPX is disabled on a per-group basis by default. Therefore, you must enable IPX for group users to access IPX. Enable IPX for group users from the Profiles > Groups > Edit > Connectivity window.

Sample IPX VPN Router topology

All IPX public interfaces configured on the VPN Router use the same IPX network address. You must enable the private interfaces that you want to use for IPX traffic, and for each private interface you must configure the IPX network address and IPX frame type. The IPX network address that you configure must match the IPX network address for that LAN, and the IPX frame type must match the IPX frame type for that LAN. In the following figure, the public interface IPX network address that the VPN Router provides is 0000A100.

In Figure 14, the private interface network address to the NetWare server is 00000B16 and the Frame Type is 802.3; similarly, the private interface network address to the Nortel Router is 00000C22 and the Frame Type is SNAP.

Figure 14 IPX topology



Note: The private LAN can also carry IP and IPX traffic simultaneously. The IP addresses are not shown in this figure.

Index

A

B

C

D

E

F

G

H

I

J

L

M

N

P

R

S

T

U

V

W